FOUNDRY

SEPTEMBER
1 9 5 7

A PENTON PUBLICATION

✔ An Appraisal of Casting Salesmen—p. 96

✔ Shell Molded Marine Crankshafts—p. 106

✔ Foundry Uses for Olivine Sand—p. 100

✔ Arizona Foundry Has Versatility—p. 112

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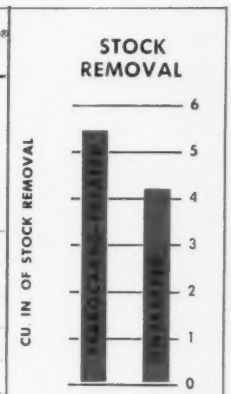
PROVED BY INDEPENDENT LABORATORY TESTS:

31.7% S·M·I*

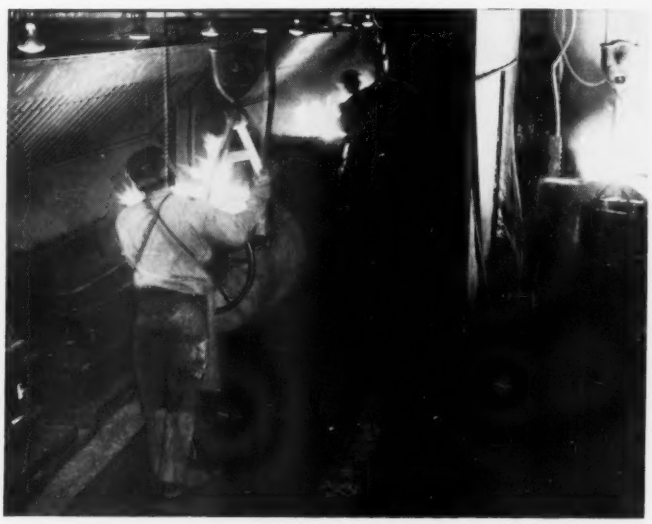
for FERROCARBO®-TREATED IRON

CHEMICAL ANALYSES	UNTREATED	FERROCARBO® TREATED
TC	3.51	3.50
Si	1.96	1.99
P	0.17	0.17
CE	4.16	4.16
Cutting speed (ft./min.)	210	210
Feed (in./rev.)	.009	.009
Depth of cut (in.)	.062	.062
Wear Land (in.)	.005	.005
Vol. of metal removed (cu. in.)	4.1	5.4
Per Cent Improvement		31.7%



* Surface Machinability Improvement
Tool wear tests were conducted with a single point "Carboloy" grade 44A tool on castings machined at commercial speeds. Flank wear was measured with a 20 power microscope.

These extraordinary test results were obtained by an independent research laboratory† on unalloyed gray iron cast by a leading Midwest foundry, using untreated and Ferrocarbo-treated iron of identical chemistry.
†METCUT RESEARCH ASSOCIATES INC.



Castings that are *easier* to machine are *easier* to sell. That's why FERROCARBO Briquettes—the unique patented cupola additive by Carborundum—are used by outstanding foundries everywhere. Tests conducted on FERROCARBO-treated gray iron manufactured by leading foundries all over the country show a machinability improvement factor as high as 73% over untreated gray iron. Now, *premium* castings are assured at *no extra cost.* LOOK INTO FERROCARBO TODAY!

WRITE FOR MORE INFORMATION on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet A-1409, Electro Minerals Division, The Carborundum Company, Niagara Falls, N. Y.

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The CARBORUNDUM Company
REGISTERED TRADE MARK

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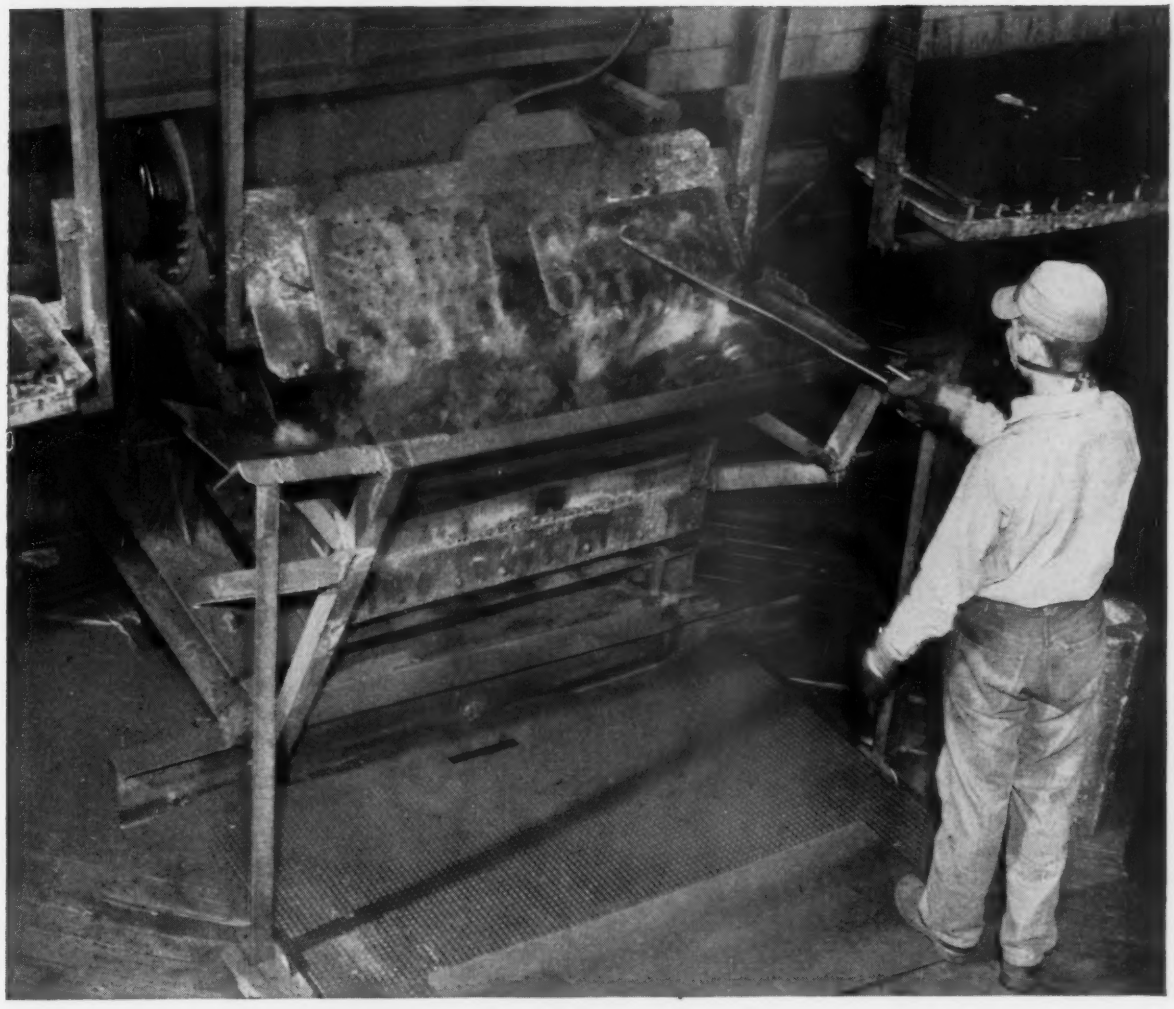
B.F.Goodrich report:



Searing hot sand burned out belt in 3 months

B. F. Goodrich improvements in rubber brought extra savings

Problem: At this foundry the sand shaken from those red-hot castings drops on an under-the-floor conveyor belt and is on its way to being used again. But the extremely hot sand baked the belt hard, made it crack and break. The belt needed constant repairs, had to be replaced every three months.

What was done: When a B.F.Goodrich salesman heard of the problem, he suggested a new belt, called Solarflex, specially designed by B.F.Goodrich engineers to handle hot materials. This belt is made of a special rubber that stays soft and pliable at temperatures that cause other belts to harden, crack and finally break down.

Savings: The B.F.Goodrich Solarflex belt has now given more than 1½ years of troublefree service—five times that of previous belts—and still shows no sign of wear. In fact, the plant superintendent says he expects at least two more years' use from the belt.

Where to buy: Your B.F.Goodrich distributor has the exact specifications on the belt that solved the problem in this foundry. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Department* ***M-161*** *Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

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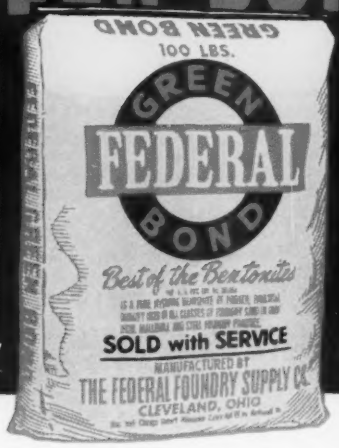
GREEN BOND
GREEN BOND
GREEN BOND
GREEN BOND



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the standard of the world for 30 years

Bentonite was first developed in 1925, by FEDERAL, as an admix to molding and core sands. FEDERAL GREEN BOND was introduced at that time as a *pure* bentonite of the highest quality, specially processed for foundry use. It's been just that ever since—unadulterated, untreated, free of chemicals or other ingredients detrimental to foundry sands or operating conditions.

FEDERAL GREEN BOND is supplied in *three* convenient forms: (1) PULVERIZED—for general foundry use as a dry additive for core and molding sand; (2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core and molding sand; (3) No. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

Next time you buy bentonite—buy the "Best of the Bentonites", the old reliable—FEDERAL GREEN BOND!

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FOUNDRY
A PENTON PUBLICATION

September 1957
Volume 85—Number 9

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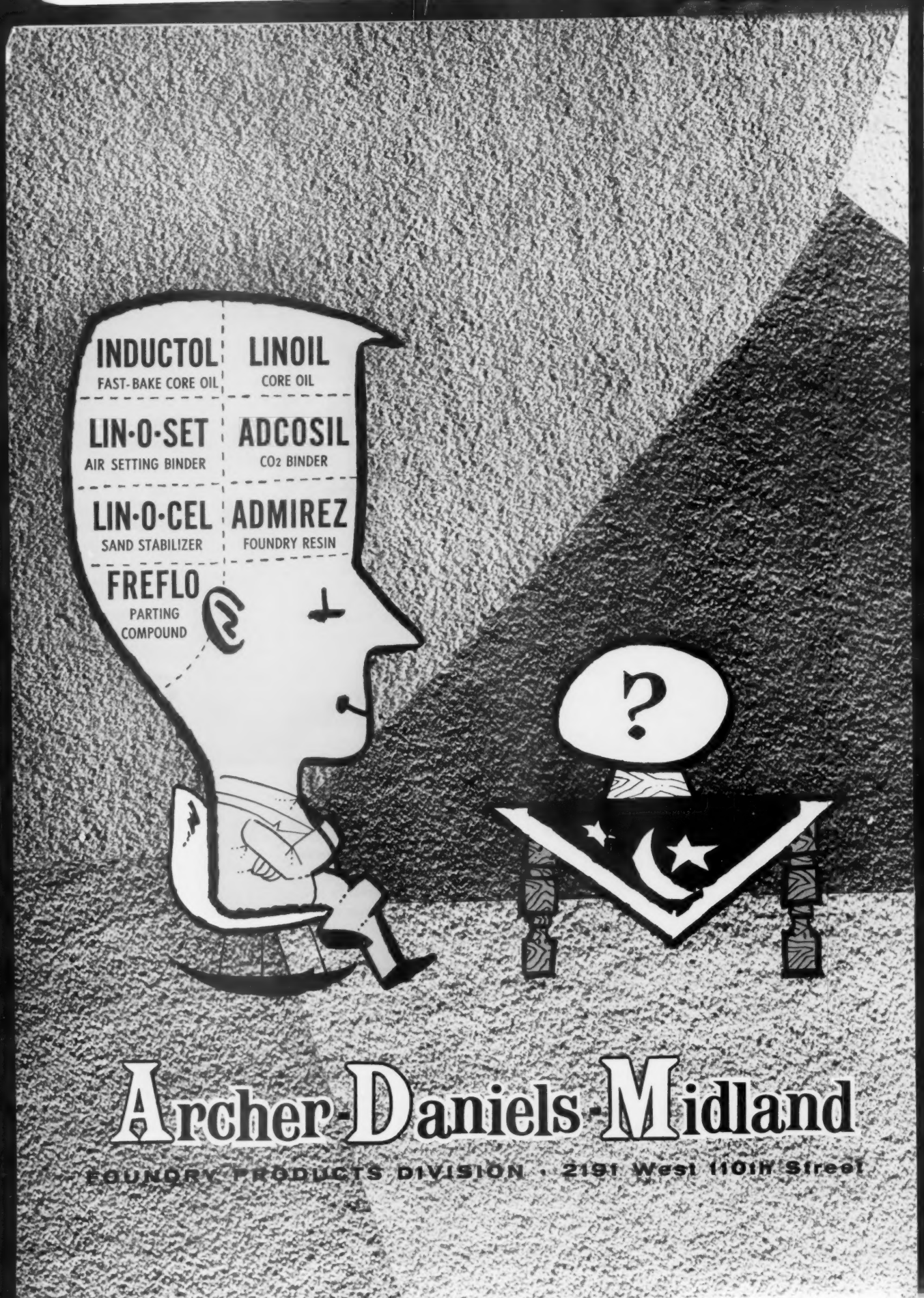
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There's an ARCHER QUALITY foundry product in your future

. . . if you're in the foundry business. That's because ADM makes a binder for every type core, for every core making system and for every type sand.

One source helps you get what you want when you want it, whether it's a standard oil-sand binder (one of the famous LINOILS for instance) or whether you're gassing cores and need an efficient special binder for CO_2 cores.

There's seldom a delay since ADM can ship from any one of a huge network of plants and warehouses across the country.

Equally diversified is the army of ADM representatives; each man is technically qualified to make practical suggestions on various processes and corresponding binders. They have no axe to grind for any single type of binder, because ADM supplies them all.

These are the reasons why it doesn't take a swami to predict that there's an Archer Quality Foundry Product somewhere in your future.

Write today for file folder of information on these quality foundry products.

Augmenting the Archer Quality Line . . .

These additional foundry products are available through ADM'S new subsidiary, The FEDERAL FOUNDRY SUPPLY Company:

SAN-BLO CORE BLOWER
WHIRLMIX SAND MIXERS
FEDERAL GREEN BOND BENTONITE
FEDERAL SAND STABILIZER
CROWN HILL SEA COAL
. . . and a COMPLETE LINE of FOUNDRY FACINGS

company

Cleveland 2, Ohio

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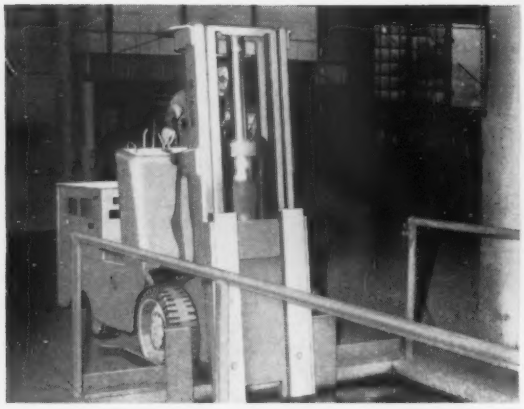
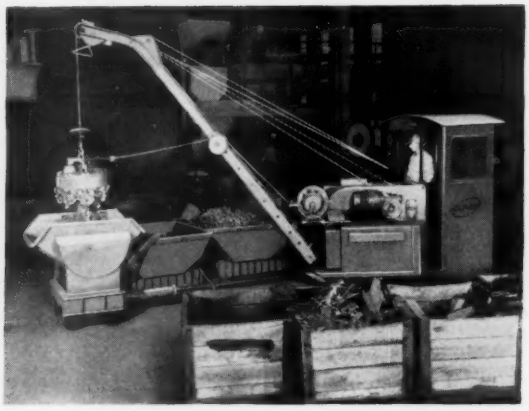
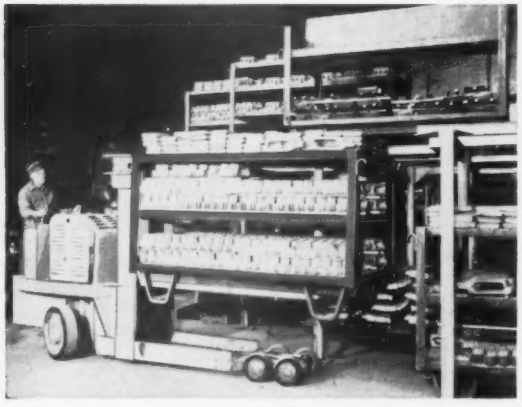
How 4 foundries save with ELPAR®



ELPAR FORK TRUCK with special forks lowers load of heat-treated castings into quench tank. Truck also loads and unloads furnaces. Castings remain on the same skid throughout the entire heat-treat cycle—and one man and the ELPAR do all the work.



ELPAR Crane with magnet loads 200 tons of scrap and pig iron into skid boxes every day. It also places measured amounts of scrap, sprue and iron into dump bucket that feeds cupola charging skip. Even dump bucket operation is controlled by craneman.



ELPAR High Lift Platform Truck speedily tiers rack of fragile cores. Because of smooth ELPAR performance and a special rack system, storage capacity has been doubled, core selection simplified and damage to costly cores eliminated.

ELPAR Low Lift Platform Truck moves loaded charging bucket weighing 9,620 lbs. from make-up point to cupola. This and one other ELPAR truck handle 450,000 lbs. every 8 hours. Schedules are maintained . . . and 80 man-hours per day are saved.

- The exact type for your specific needs . . .
- Safe, sure handling of scrap, cores or castings . . .
- Built-in dependability that assures steady year-after-year service . . .

. . . For these three reasons alone, it will pay you to make your next truck an ELPAR.

SEND FOR
CASE HISTORIES
2, 14, 29, 31

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4316 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

FOUNDRY RESEARCH includes

Lectromelt*

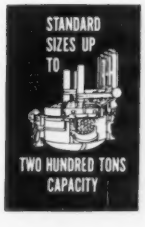
FURNACES in planning for the future

Electric arc furnaces give the exact control of heat and analyses needed to produce today's engineered castings. That's why research men, developing tomorrow's manufacturing methods, employ Lectromelt furnaces. They point the way to finer castings, faster production and lower costs.

Two Lectromelt furnaces are shown here in the laboratory where processes are worked out for a corporation's various foundries—small enough to expedite experiments, big enough to simulate production runs. With metallurgical research finding more and more uses for special alloy castings, foundries need such dependable Lectromelt equipment to meet their rigid requirements.

Catalog 9-B describes Lectromelt furnaces. For a copy, write to the Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

*Reg. T. M. U. S. Pat. Off.



ITALY: Forni Stein, Genova . . . JAPAN: Daido Steel Co., Ltd., Nagoya . . . ENGLAND: Electric Furnace Co., Ltd., Weybridge . . . GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg . . . SPAIN: General Electrica Espanola, Bilbao . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege.

Circle 558 on Inquiry Card—Page 51

SEEING IS BELIEVING!

Here's how Hines solves molding problems

Shown above is one of three albums we've assembled, containing hundreds of installation photos of Hines "POP-OFF" Flasks and Jackets in leading foundries around the world. In addition to pointing out the preference for Hines equipment, these photos give evidence that Hines has successfully designed and produced flasks for even the most difficult molding jobs — no matter what size or how complex.

Cope and drag unit in malleable iron foundry using Hines Pop-off flasks. Molds placed on powered conveyor cars.

Checking through these albums and noting how Hines Flasks have done the job in other foundries might help solve *your* molding problems. Hines representatives have duplicate sets of albums and you are cordially invited to request seeing them. Just get in touch with your Hines representative or write or call us for other arrangements.

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO

PHONE: ORCHARD 1-2806

HINES POP-OFF FLASK FEMA

Circle 559 on Inquiry Card—Page 51

60 TONS

of hot castings daily

Every 16-hour day, 60 tons of castings with temperatures to 250° F. ride this Imperial Belt. The belt is Imperial* Standard Rexall—Impregnation 615 (117′ x 30″ x 5 ply)—a brand developed for the rugged requirements of this abrasive foundry service.

Long service life—Installed in 1953, this belt has been in continuous operation at the Chambers, Bering, Quinlan Co., a jobbing foundry. Such long life is the result of Imperial's superior manufacturing processes that include exclusive double stitching and special impregnating compounds.

These features are described fully in Imperial's NEW Belting Catalog and Engineering Handbook, an extremely helpful and cost-saving publication for every user of industrial belting. Use the coupon to order your copy today.

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Imperial

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You expect MORE from Imperial . . . and you get MORE!

Mail this coupon today for NEW Belting Catalog and Engineering Handbook

Name_____

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Circle 560 on Inquiry Card—Page 51

With the Editors

UNDERSTANDING Needed: The American Iron & Steel Institute recently published the fourth annual edition of "Charting Steel's Progress." This 72-page booklet presents the significant statistics of the industry in exceptionally attractive graphic form.

Subjects covered include steelmaking raw materials, their sources and use; steelmaking capacity, its location and growth; expanding steel production; distribution of steel products; wages, hours and working conditions in the steel industry; and the steel industry's financial affairs.

The booklet is being sent to newspaper and magazine writers, government bureaus, technical and trade associations, public libraries, universities, financial analysts and other individuals and groups. It undoubtedly does a fine job in providing a better understanding of the steel industry—what it is and what it does.

A year or so ago a committee of the National Castings Council studied the possibility of undertaking a similar public relations job for the foundry industry. The report of the committee registered unanimous approval for a booklet on the foundry industry, but the matter of financing the project provided the stumbling block.

The foundry industry needs to be better known among many groups influencing public opinion. Its basic character, its size and its contributions to our modern civilization and the American economy should be better understood.

Perhaps some of these days, means can be found to do a job which may be less pretentious but just as effective as the splendid booklet published yearly by the steel industry.

—o—

Cover Photograph: The interesting photograph reproduced in four colors on the cover of this issue was taken in the plant of General Iron Works Co., Denver, the Meehanite foundry of the Stearns-Roger Mfg. Co., Denver. The photographer was Mike H. Simon, 19 South Second Ave., Brighton, Colo. With the title "Fluid Steel," it was selected by *Photography Annual* several years ago as an example of good photography. We feel the same way about it.

—o—

International Reprints: Congratulations to the management of the International Foundry Congress held in Stockholm Aug. 16-24 for the excellent manner in which the congress papers have been preprinted. Two volumes totaling 715 pages carry the papers as well as summaries in English, French and German. Availability of the information should be a great help to those attending the convention.

The United States was represented on the program by the following three papers: "The Foundry Environment," by Herbert J. Weber, director, Safety, Hygiene and Air Pollution, AFS; "Automatic Tempering of Molding Sand," by Harry W. Dietert, chairman, Harry W. Dietert Co., Detroit, and president, AFS; Alex Graham and Randolph Dietert, research engineers, Harry W. Dietert Co., Detroit; "Engineering Aspects of Core Box Design," by Richard L. Olson, chairman of board and president, Dike-O-Seal Inc., Chicago.

Vincent Delport, European editor of FOUNDRY, attended the congress at Stockholm, and a report will be presented in an early issue.

—o—

Honored: Our congratulations to Wyndham R. Bean, Elwyn Farm, Staunton, Va., retired vice president, Whiting Corp., and a past president of AFS (1920-1922), for being initiated as an honorary member in Omicron Delta Kappa, honorary leadership fraternity at Virginia Polytechnic Institute, Blacksburg, Va. Mr. Bean is an alumnus of that institution (Class of '02) and in recent years has played an important part in developing the McCormick Memorial project at VPI.

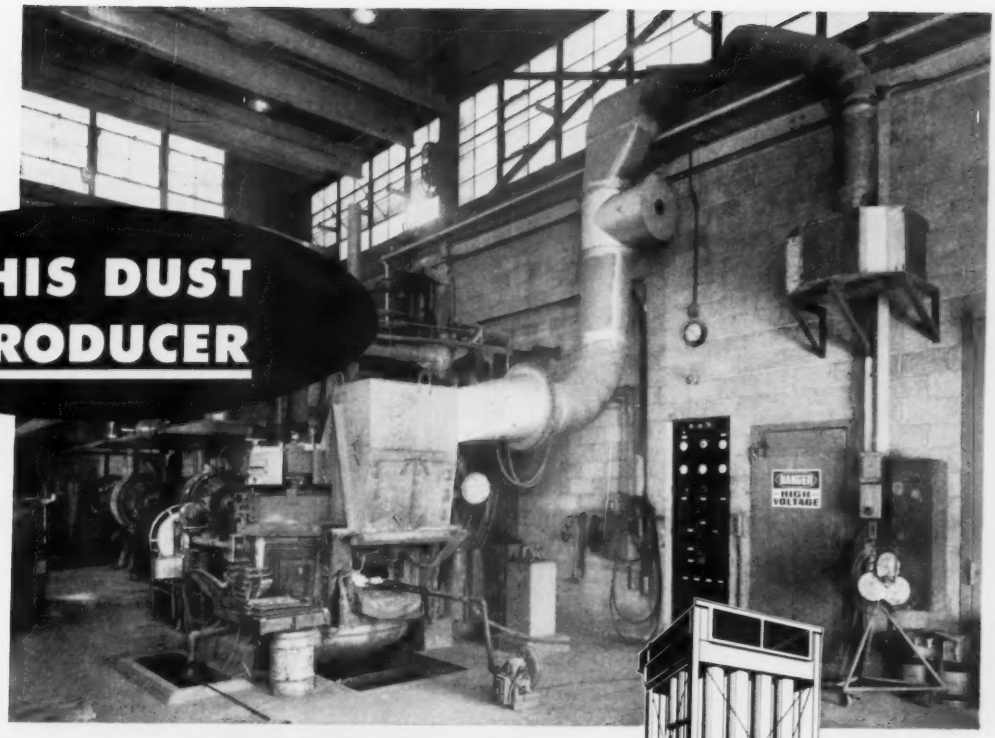
—o—

Comments by Delport: A short talk by Vincent Delport, European manager, FOUNDRY, was reported in the July issue of the *British Foundryman* as follows:

At the annual general meeting held at Harrogate on June 18th P. A. Russell paid a warm tribute to Vincent Delport for his 25 years of service on the council of the Institute. Mr. Delport, who was invited by the president to address the meeting in reply, made the following remarks which will be of interest to younger members.

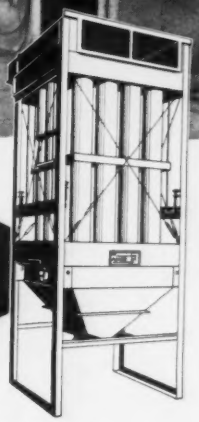
He said that during most of the past 25 years he had been on the general council, he had served on several committees, and in particular he was convener of the costing committee in the years 1935-1937, and he had derived the very greatest satisfaction from his work in the Institute; there was a lot of satisfaction in helping one's colleagues in the industry.

Young men joined the Institute not only to derive benefit from it by increasing their knowledge, but it gave them also the opportunity to help their partners. The way to do that was to attend as many meetings of their branches as they could, and also—and this was very important—to take part in the discussions at those meetings. Most of us suffered from stage fright when we first spoke at a



THIS DUST PRODUCER

meets its master in THIS DUST COLLECTOR



AAF AMERjet eliminates metallic fumes from electric melting furnaces

A haze of smoke, dust and fumes need not accompany your electric melting furnace operation. Not when AAF's amazing AMERjet will efficiently and automatically eliminate visible traces of all three!

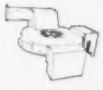
This rugged fabric arrester continuously (and automatically!) conditions its own media with a reverse jet of high pressure air. This permits velocities through the cleaning tube up to *five times higher* than is possible with ordinary fabric collectors. In addition, AMERjet offers these big plus values: (1) occupies ½ the space of conventional collectors, (2) reduces installation cost by 50%, (3) lowers maintenance costs by 45%.

For complete product information on the AAF AMERjet fabric dust arrester, call your local American Air Filter representative or write direct for Bulletin 279.

AAF herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P.Q.

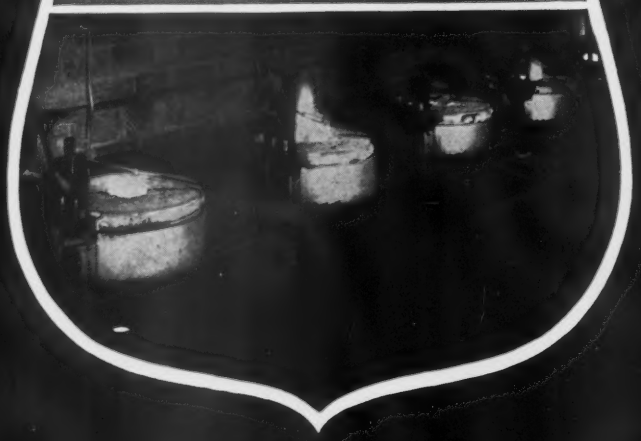


AAF FURNACE HOOD

The AAF Furnace Hood, introduced in 1937, made electric melting furnace fume collection practical for the first time by confining the fumes for collection. The hood, *now being used by one steel foundry out of every three,* is described in Bulletin 278.

HAUSFELD
FURNACES

FOR GAS
OR FUEL OIL



ARE MEETING EVERY EXACTING REQUIREMENT

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

HAVE YOU INVESTIGATED THEM FOR YOUR MELTING PROBLEMS?

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

meeting, but we had to overcome that. One could start by just asking a few questions, and later one would take a more active part in the discussions. He asked the younger members to contribute papers to their branches as soon as they felt able to do so—all branch secretaries were anxious to get as many papers as they could—and in that way the younger members could help considerably and could increase the status of their branches and their own prestige.

Having passed those two hurdles they might be elected to serve on their branch councils and perhaps become representatives of their branches on the Institute council. They must be prepared to work on various committees, particularly on the sub-committees of the technical council, for thereby they would render great service to the Institute, increase their experience, and derive great satisfaction, building up many friendships, the memory of which they would preserve until the end of their working lives.

—o—

On Tour: A glance at the "Calendar of Meetings," appearing on Page 14 of this and every issue, emphasizes the fact that the foundry industry will have a very busy time this fall and early winter. Annual, general and industry meetings of foundry and allied organizations, and foundry regional conferences will be supplemented by meetings of boards, trustees, committees, chapters and other local groups. The amount of time devoted to such meetings by individual foundrymen will be tremendous.

General or annual meetings will include the following: American Die Casting Institute, Edgewater Beach Hotel, Chicago, Sept. 17-18; Malleable Founders' Society, Hotel Cleveland, Cleveland, Sept. 20; Steel Founders' Society of America, Homestead, Hot Springs, Va., Sept. 23-24; Gray Iron Founders' Society, Drake Hotel, Chicago, Oct. 10-11; Magnesium Association, Biltmore Hotel, New York, Oct. 17-18; Foundry Equipment Manufacturers' Association, Greenbrier, White Sulphur Springs, W. Va., Oct. 17-19; American Society for Metals (including Metal Show) Chicago, Nov. 2-8; National Foundry Association, Waldorf-Astoria, New York, Nov. 7-8; Steel Founders' Society of America (T & O Conference), Hotel Carter, Cleveland, Nov. 11-13; Investment Casting Institute, Sheraton Hotel, Chicago, Nov. 19-21.

The fall regional conferences will be as follows: Missouri Valley, Missouri School of Mines, Rolla, Mo., Sept. 26-28; Michigan, Michigan State University, East Lansing, Mich., Oct. 3-4, Northwest, Hotel Vancouver, Vancouver, B.C., Oct. 18-19; New England, Massachusetts Institute of Technology, Cambridge, Mass., Oct. 18-19; Niagara Frontier, Hotel Statler, Buffalo, Oct. 24-25; Metals Casting, Purdue, Lafayette, Ind., Oct. 31-Nov. 1.

FOUNDRY editors will attend many of these meetings to prepare reports for publication. We hope to see you at one or more of the affairs.

F.G.S.

Feeling M-i-g-h-t-y Low?

IF SNAGGING-TIME AND CLEANING-ROOM COSTS HAVE YOU DOWN IN THE DUMPS, DON'T MONKEY AROUND. Switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding development in years.

Users all over the nation report that they like the fast, easy cutting action of CINCINNATI (PD) SNAGGING WHEELS. Our customers report, too, that *Positive Duplication* (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. And these better, cost-cutting (PD) *Snagging Wheels are priced no higher than ordinary wheels.*

So, let us help you see the bright side of life once more. Just contact your CINCINNATI GRINDING WHEELS distributor and get full details on (PD) WHEELS. Or, contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

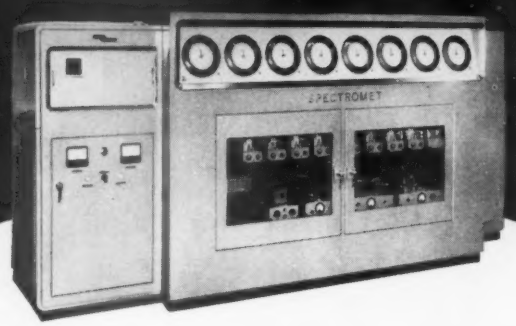
Circle 563 on Inquiry Card—Page 51

How can Analytical Equipment squeeze out more profit dollars?

By making rapid, accurate analyses — in seconds — on the production floor!

By eliminating losses caused by off heats!

By using the *Baird–Atomic* SPECTROMET!!!



Analyses of metals in production maintains a constant high level of quality control, at a production rate requiring minimum furnace time.

Another plus — the savings in alloys. The B-A Spectromet provides percent concentration within 60 seconds, thus less alloying materials are lost during meltdown. Speed and accuracy are inherent features of the B-A Spectromet.

The moment spent to write for full details will be well rewarded.

BAIRD ATOMIC

Baird–Atomic, Inc.

33 UNIVERSITY ROAD, CAMBRIDGE 38, MASS.

Calendar of MEETINGS

Sept. 9-13—Instrument Society of America, 12th annual instrument automation conference, Public Auditorium, Cleveland.

Sept. 17-20—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 20—Malleable Founders' Society, fall meeting, Hotel Cleveland, Cleveland.

Sept. 23-24—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 25—Non-Ferrous Founders' Society, management and operating conference, Coronado Hotel, St. Louis.

Sept. 26-28—Missouri Valley Regional Conference, Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 3-4 — Michigan Foundry Conference, Kellogg Center, Michigan State University, East Lansing, Mich.

Oct. 3-4—Refractories Institute, fall meeting, Grand Hotel, Point Clear, Ala.

Oct. 9-11—Gray Iron Founders' Society, annual meeting, Drake Hotel, Chicago.

Oct. 12-15 — Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

Oct. 17-18—Magnesium Association, annual convention, Biltmore Hotel, New York.

Oct. 17-19—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 18-19—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 18-19—Northwest Regional Foundry Conference, Hotel Vancouver, Vancouver, B. C.

Oct. 21-25—National Safety Council, national safety congress and exposition, Conrad Hilton Hotel, Chicago.

Oct. 24-25—Niagara Frontier Regional Foundry Conference, Statler Hotel, Buffalo, N. Y.

Oct. 31-Nov. 1—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 2-8—American Society for Metals, national metals exposition and congress and 2nd world metallurgical congress, International Amphitheatre, Chicago.

Nov. 7-8—National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York.

Nov. 11-13—Steel Founders' Society of America, technical and operating conference, Hotel Carter, Cleveland.

Nov. 19-21—Investment Casting Institute, annual fall meeting, Sheraton Hotel, Chicago.

Dec. 4-6—American Institute of Mining, Metallurgical and Petroleum Engineers, electric steel furnace conference, Penn-Sheraton Hotel, Pittsburgh.

1958

Jan. 17—Malleable Founders' Society, semi-annual meeting, Hotel Cleveland, Cleveland.

Feb. 6-7—Malleable Founders' Society, technical and operating conference, Wade Park Manor, Cleveland.

Feb. 13-14—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 20-21—Southeastern Regional Foundry Conference, Chattanooga, Tenn.

Mar. 12-13—Foundry Educational Foundation, college-industry conference, Hotel Statler, Cleveland.

Mar. 17-18 — Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

May 12-16—American Society for Metals, 1st Southwestern metal congress and exposition, Automobile Bldg., Dallas, Tex.

May 19-23—American Foundrymen's Society, 62nd annual convention and exhibition, Public Auditorium, Cleveland.

June 9-12—National Materials Handling Exposition, Public Auditorium, Cleveland.

June 9-13—International Automation Exposition and Congress, Coliseum, New York City.

June 22-27—American Society for Testing Materials, annual meeting, Statler and Sheraton-Plaza Hotels, Boston, Mass.

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MISS
LIQUIDIZER
GUIDE YOU
TO

Increased yield!

Soffel's Exothermic
Carbon-Free Liquidizers
will increase yield
and reduce feeding metal.
Contact your PMP Distributors
for a demonstration.

Photo by H. Armstrong Roberts

Write today for your copy of our new 8-page Brochure B-101-57. It describes and illustrates the efficient way to use Soffel's Exothermic Products.

PITTSBURGH METALS PURIFYING CO., Inc.
1352 Marvista St., N. S. Pittsburgh 12, Pa.

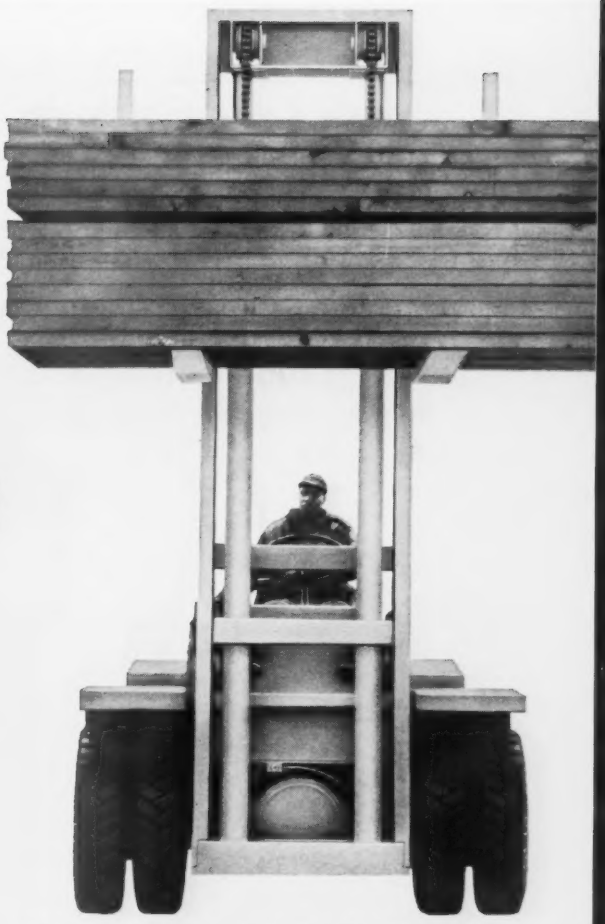
"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

NEW YALE G-3

CAPACITIES: 15,000 – 20,000 LBS.

SERIES

the only high-capacity gas trucks with all three features you need for fast, safe handling of BIG LOADS



300% MORE VISIBILITY. "Wide-Angle Vision"—a Yale exclusive! Upright channels are wide-spaced and nested. Hoisting cylinders and lifting chains are right next to channels to reduce frontal obstruction. Fork carriage has only one top, one bottom bar for extra forward visibility at all levels of fork lift. Unique open front design plus high center position of driver provide a wide arc of vision—maximum visibility forward *and* to the rear for fast, safe handling of heavy loads.

GREATER STABILITY. You get maximum stability under capacity-load conditions—even over soft or bumpy terrain. Center of gravity is low. Underclearance is high. Large, high-flotation tires give plenty of traction. Articulated steering axle, rugged wide-spaced upright design, side-thrust rollers keep loads steady at all points of lift, minimize weaving.

EXTRA MANEUVERABILITY. Short overall length plus 75-degree steer-wheel angularity mean extra-tight turning radius —high maneuverability. Power steering helps driver to move in and out of tight areas fast. For fast cycle operations, these new Yale trucks feature lifting speeds up to 60 feet per minute... fast, controlled lowering... travel speeds up to 20 MPH.

New G-3 Series Gas Trucks Have Famous Yale Quality—Premium Engineering Features Included as Standard:

- **For extra strength:** All welded steel frame. H-beam members in frame. Rugged channel construction.
- **For driving comfort:** Hoist, tilt, attachment and gearshift controls are grouped for easy-reach, right-hand operation. Directional control on steering column.
- **For maximum safety:** Power brakes. Anti-cavitation valve in tilt cylinders prevents hydraulic voids, stabilizes channels.
- **For easy maintenance:** Hinged hood and removable covers give easy access to engine and all other operating units.
- **For smooth lifting action:** Channels and carriage are mounted on roller bearings with side-thrust rollers. Lifting cylinders are ball mounted.
- **Your choice of Fluid Coupling or standard transmission.** Gasoline or LP-Gas powered models. Wide range of attachments—all engineered for a minimum loss distance.

YALE*

*REG. U. S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

The Yale & Towne Mfg. Co., Yale Materials Handling Division
Manufacturing Plants in Philadelphia, Pa., and San Leandro, Calif.

Gasoline, Electric & LP-Gas Industrial Lift Trucks • Worksavers
Warehousers • Hand Trucks • Hand and Electric Hoists

Circle 566 on Inquiry Card—Page 51

The YALE & TOWNE Manufacturing Co.
Dept. A-349, Roosevelt Boulevard, Philadelphia 15, Pa.

Please send me the new Yale High-Capacity Gas Truck brochure No. 5230A.

Name_____ Title_____

Company_____

Address_____

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YOU'LL DO A BETTER JOB

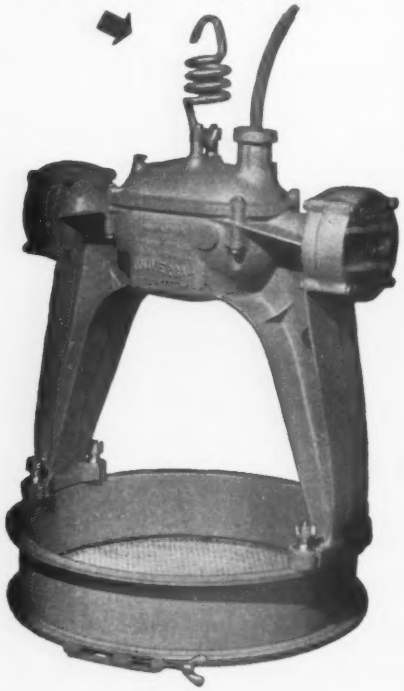
with **H. V. ADAMS DESIGNED**

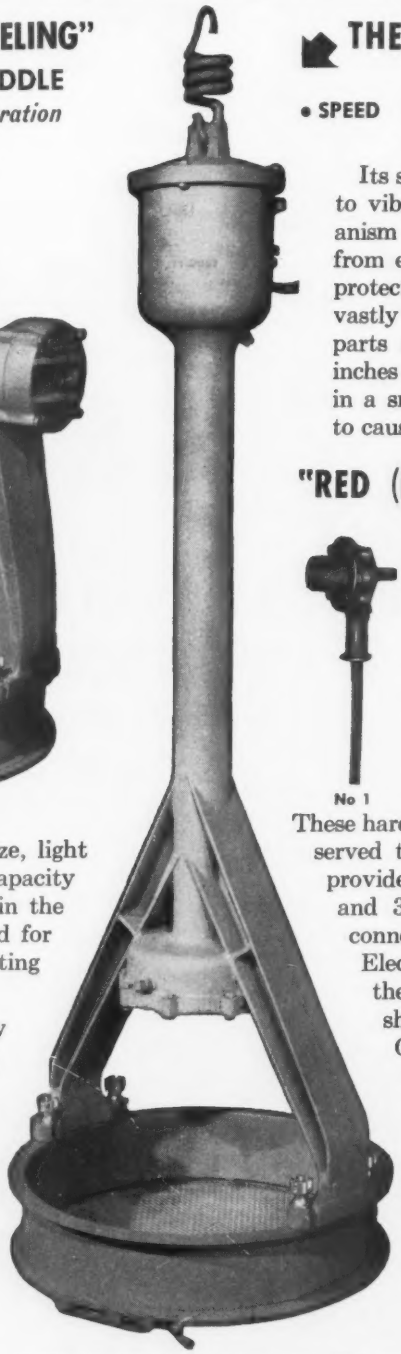
HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration





Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.

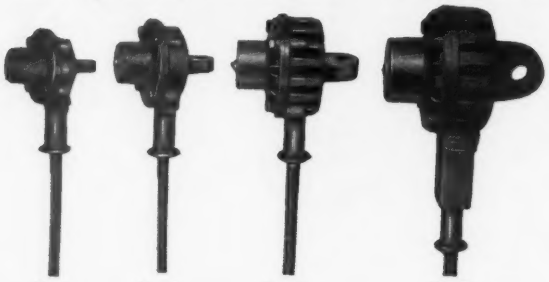
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

• SPEED • ECONOMY • SAFETY • LONGER LIFE
• GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area — are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Swim suit
by Jantzen

nice to
look at....

nice to
work
with...

The finest
malleable
shot and
grit on
the market

METAL BLAST, INC.

872 EAST 67th STREET CLEVELAND 3, OHIO

Exclusive with the Hercules

Adams 10″—32″
Jolt Squeezer
Portable Type

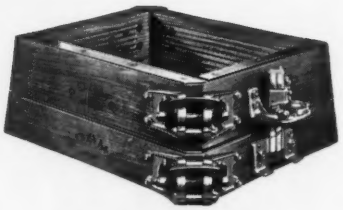
PARTNERS IN PRODUCTION

Adams moulding machines and custom-built flask equipment

Here are the Partners that keep production rolling and costs low. The Partners that help you meet today's increasing competition with *faster* production of *better* castings at *lower cost.*

Adams Molding Machines—have the speed, power and durability for consistently large output day after day. You get accurate, uniform molds through close control of jolting and squeezing operation.

Adams Flasks—custom-built to your exact specifications. Get these Partners on your production team. Write today for full information.



Adams Cherry Easy-Off Flasks

Adams Jackets, Cast Iron or Aluminum

Adams Steel Jackets

The ADAMS Company

ESTABLISHED 1883

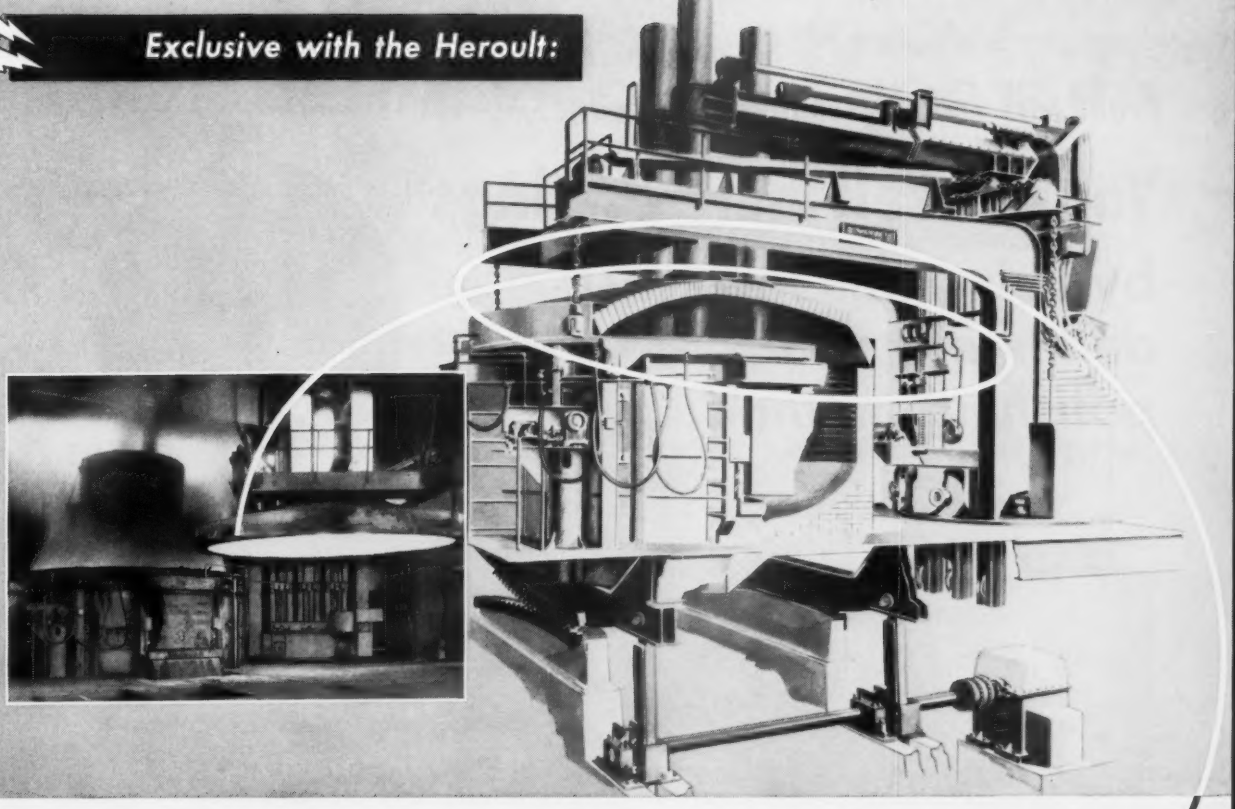
MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 569 on Inquiry Card—Page 51

Circle 570 on Inquiry Card→

Exclusive with the Heroult:



Water-cooled Skew Back Roof Ring

One of the features of the new Heroult is its low-cost maintenance. It is designed to make bricking easy and economical. Even the repair of the removable roof can be accomplished in much less time and with less labor and material cost. For the Heroult is the only electric furnace on the market with a water-cooled, skew-back type of roof ring. This patented design feature eliminates the need of special skew-shaped brick.

Embodying the latest in mechanical and electrical equipment, these widely used furnaces are noted for efficient performance and low operating and maintenance costs.

They are available in size of shell diameter ranging from 7′0″ up to 24′6″, and with rated charge capacity of from 8000 lbs. up to 400,000 lbs. They are equipped with removable roofs to permit top charging. Both gantry and swing-type roof-removing mechanisms are available. Door-charging furnaces and furnaces of special design, including units equipped with non-magnetic steel bottoms to permit induction stirring, can be supplied.

We welcome an opportunity to help you select and install the Heroult best suited to your needs.

The Heroult is the only 100% mechanically operated electric furnace

All of the movements of the Heroult are handled by motor-driven gear mechanism. This is a very important advantage, for it eliminates many maintenance difficulties. Your own maintenance man can easily keep this modern electric furnace performing efficiently with a minimum of service.

This and other Heroult exclusives, such as cage-type shell construction, independently supported operating mechanism, and water-cooled skew-back roof ring, make the Heroult the finest electric melting furnace on the market.

Ask for latest catalogue

This free catalogue will help you determine how Heroult Electric Furnaces can improve your operation . . . and enable you to make better quality steels. Tells you where and when an electric furnace is desirable. Gives furnace types, sizes, capacities and ratings. For your free copy, just contact the office nearest you, or write direct to Pittsburgh.

Heroult
ELECTRIC
MELTING FURNACES

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORPORATION, GENERAL OFFICES:
525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.
United States Steel Export Company, New York

USS

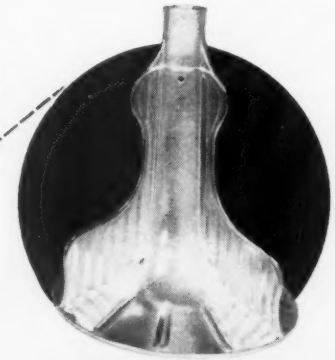
UNITED STATES STEEL

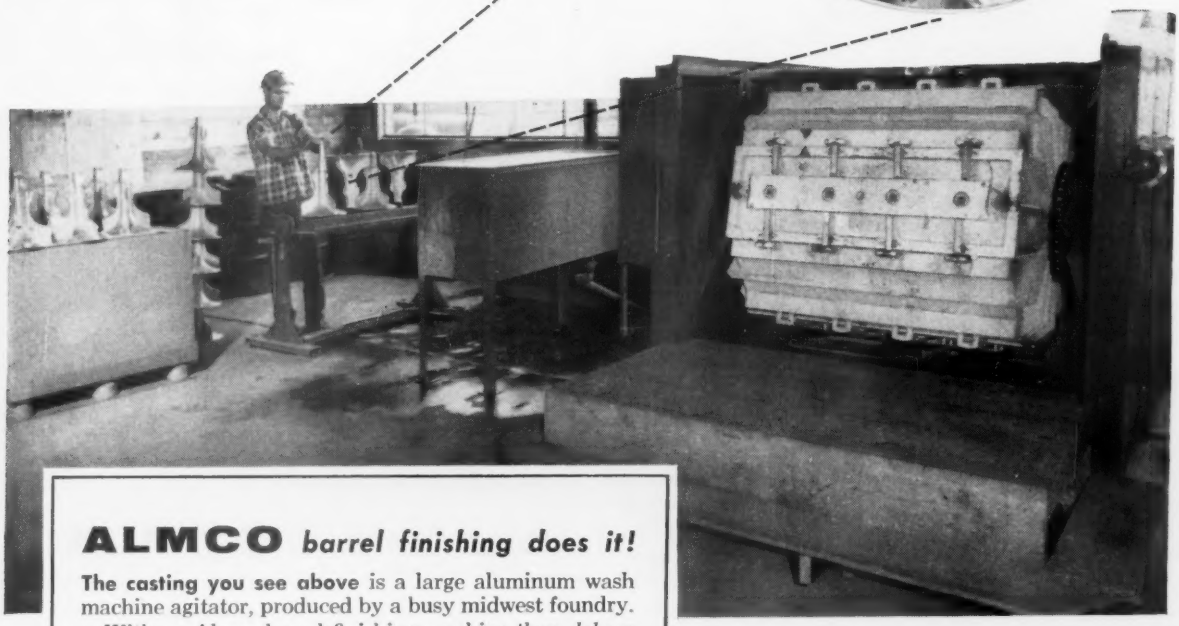
FOUNDRYMEN WHO KNOW

From this foundry comes a bulletin...

You can sell more castings

by using this low-cost deburring and polishing method!





ALMCO *barrel finishing does it!*

The casting you see above is a large aluminum wash machine agitator, produced by a busy midwest foundry.

With an Almco barrel finishing machine they *deburr and polish 48 of these castings per hour.* And the foundry's customer receives a smooth, polished casting with no rough edges, and the most beautiful high sheen you can imagine!

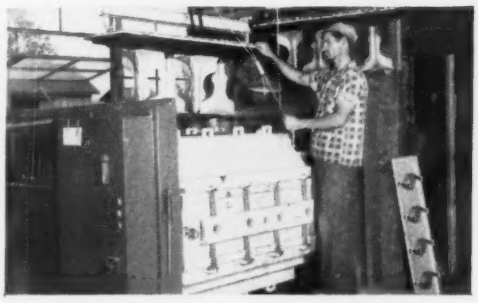
This is how many modern foundries are getting extra business—being able to deliver castings at an advanced stage of preparation for assembly.

The secret is Almco barrel finishing! In most cases, it is just too costly to attempt deburring, grinding, polishing, work-hardening, microinch finishing, etc., by hand methods or machining. But a particular Almco process, worked out exactly in the Almco lab, can provide these services at lowest possible cost, enabling you to offer "advance stage" castings at competitive prices.

Check into it! Write Almco, asking a sales engineer to call and arrange for detailed sample processing on your castings, without obligation. Or send sample parts direct to Almco, specifying results desired. Take action today!

SEND FOR THIS NEW BARREL FINISHING HANDBOOK

Complete description of the most advanced modern processes. 52 pages of facts, photos, data and cost comparison charts. Write for your personal copy today.



Wash machine agitators are finished by using special fixtures on the four Almco barrel doors. These hold the castings firmly while deburring and polishing action takes place. 16 agitators can be processed at once.

ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.

149 Marshall Street • Albert Lea, Minn.

Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.

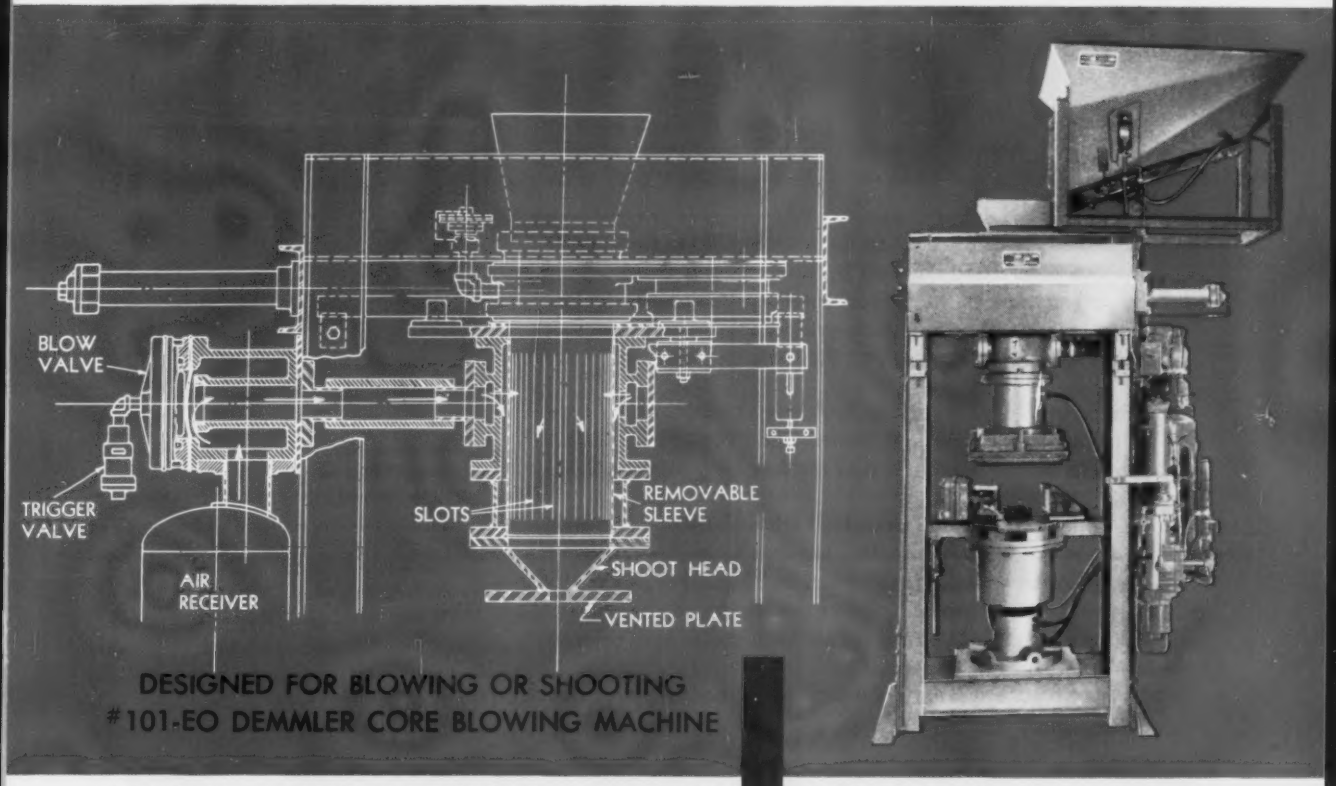
Circle 571 on Inquiry Card—Page 51

Circle 572 on Inquiry Card→

FOUNDRYMEN WHO KNOW
PREFER DEMMLER CORE SHOOTERS

One of America's leading steel foundries conducted an unbiased 60 day test under identical conditions to determine whether they would standardize on a foreign made core shooter or the Demmler 103-EO. Results: Demmler proved superior in shooting and blowing -- FIRST in highest production. Demmler is now specified standard core producing equipment. Complete information on this test and on the 101-EO available on request.

DEMMLER FIRST NAME IN CORE BLOWERS

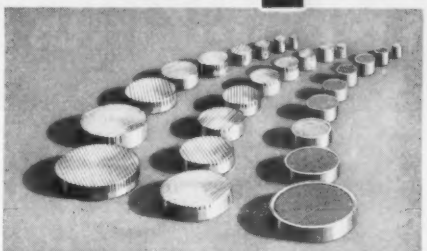


DESIGNED FOR BLOWING OR SHOOTING
#101-EO DEMMLER CORE BLOWING MACHINE

DEMMLER MANUFACTURING COMPANY | **KEWANEE, ILLINOIS**

HL 150 MESH VENTS

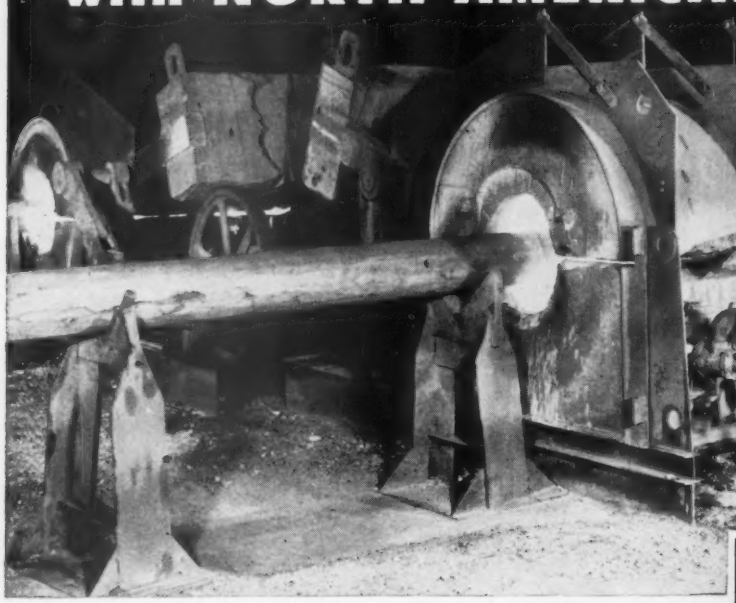
A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.

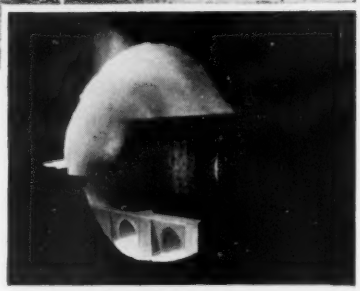


PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

Huge Crankshafts
GET HOT IN A HURRY
with NORTH AMERICAN Burners





High speed heating, such as usually applied to small parts in mass production, is used by **Erie Forge & Steel Corporation** for heating huge locomotive crankshafts for die press forging . . . convincing evidence of the efficiency of North American Burners and Blowers.

Amazingly, **#6 oil** is used to fire these compact barrel-type furnaces. North American Blowers and Series 212 Burners provide thorough atomization for fast heat release.

8⅞" billets are heated from 1100 F to 2350 F in a day-long **average** time of 36.9 minutes. The result—superior quality metal. Average oil consumption is 32 gallons per ton of steel. It will pay you to look into the results you can expect by installing North American for high speed heat release.

Large photo shows 8⅞" billets in 2 of 8 small (36" I.D.) furnaces. Note Burners in right foreground.

Small photo is a close-up view showing burner tiles and flames whipping around a partially forged 10" crankshaft in a large furnace.

For detailed engineering information, consult your nearby North American combustion specialist. For equipment information, write for bulletin.

NORTH AMERICAN COMBUSTION Since 1917

The NORTH AMERICAN Manufacturing Co.

Combustion Engineers

Cleveland 5, Ohio

Save Time, Maintenance and Money In Your Metal-Melting . . .

Specify Norton Refractory Cements

FOR FERROUS METAL-MELTING

type of equipment	metals melted	use of cement	Norton cement recommended			how applied
			number	maturing temperature		
indirect arc	alloy iron and steels	lining	RA 1307	1150°C	2100°F	rammed
		patching	RA 1307 RA 1162	1150°C 1000°C	2100°F 1850°F	rammed rammed
direct arc	alloy steel and malleable iron	troweling around electrodes	RA 1162	1000°C	1850°F	trowled
		lining roof and around electrodes	RA 1307	1150°C	2100°F	rammed
high frequency induction	stainless steel and refractory alloys	lining	RM 1170	1150°C	2100°F	rammed (dry)
		patching large furnaces	RM 1152	1200°C	2200°F	rammed
		patching small furnaces	RM 1992	1100°C	2000°F	troweled or rammed
ladles	iron and steel	lining	RA 1307	1150°C	2100°F	rammed

FOR NONFERROUS METAL-MELTING

low frequency induction	Al, Te, Si bronzes	lining	RM 1140	1250°C	2300°F	rammed
	general purposes	lining	RA 1307	1150°C	2100°F	rammed
indirect arc	brasses and bronzes	lining and patching	RA 1307	1150°C	2100°F	rammed
crucible melting furnaces ■	brasses and bronzes	lining and patching	RC 1188	1100°C	2000°F	rammed
reverberatory furnaces ▲	brasses and bronzes	lining and patching	RC 1188	1100°C	2000°F	rammed

■ Cement not in contact with metal; used in combustion chamber. ▲ Cement in contact with metal.

Norton ALUNDUM* fused alumina (RA), CRYSTOLON* silicon carbide (RC) and MAGNORITE* fused magnesia (RM) cements are stable and very refractory. Carefully blended to assure proper grain size distribution, they are excellent for the widest range of operations.

For complete facts as to the nature and selection of these *engineered and prescribed* Norton Rx's, contact your Norton Representative. He'll supply you with the booklet *Norton Refractory Cements.* Or write for your free copy to NORTON COMPANY, Refractories Division, 308 New Bond Street, Worcester 6, Mass.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
REFRACTORIES
Engineered... Rx ...Prescribed
Making better products... to make your products better

NORTON PRODUCTS: Refractories • Abrasives Grinding Wheels • Grinding Machines
BEHR-MANNING DIVISION PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

DESULPHURIZATION...

LINDE's desulphurization method, for use with calcium carbide, is simple, efficient, and economical. The principal parts, shown here, are nitrogen supply, dispenser, and injection tube.

You get uniform results with Metallurgical Carbide from LINDE

In the foundry, you can produce high grade iron only by making sure you use metal with a low sulphur content. As a desulphurizing agent, metallurgical calcium carbide assures *uniformity* in the metal you produce. You know in advance that by adding a certain amount of carbide you remove a certain percentage of sulphur. Because metal specifications can be met efficiently and economically with carbide, you eliminate any need for wasteful "trial and error" methods.

Linde's method of mixing UNION calcium carbide and molten iron is simple and sure. A stream of fine mesh carbide and nitrogen under pressure is forced from a dispenser through a hose. The graphite injection tube is immersed deep in the hot metal. The carbide blends evenly and thoroughly with the iron. Desulphurization with UNION calcium carbide creates no fumes, does not attack refractories. The LINDE equipment—nitrogen supply, dispenser, and injection tube—is easy to operate and maintain.

If you would like more information about LINDE's method of desulphurization, using calcium carbide, just call or write your nearest LINDE office. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

Linde
TRADE MARK

UNION CARBIDE

The terms "Linde," "Union" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

COLEMAN OVENS

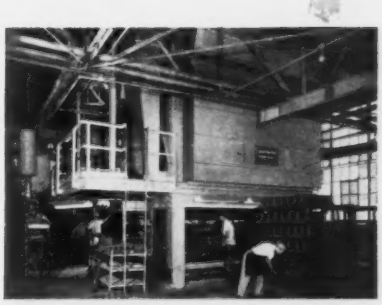
turn minutes into money...

Fast, efficient production of uniformly good cores and molds is vitally important to foundry profits.

When you use old, out-dated core and mold ovens the minutes and hours lost in costly rejects and make-overs . . . the time and effort lost in wasted man power, the production lost in casting scrap eat your profits away. Modern design and exclusive advantages of Coleman Ovens result in immediate production economies, reducing overall core department costs by as much as 50% ! Such savings mean increased profits and rapid investment amortization.

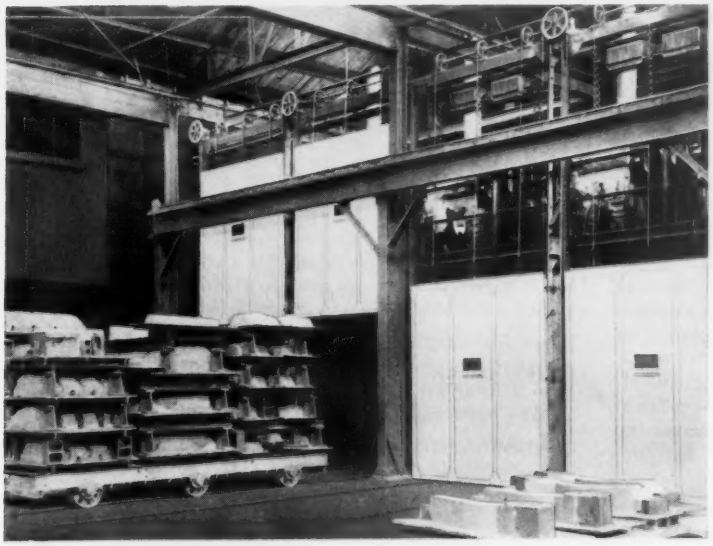
More than half a century of specialized foundry oven experience is your assurance that the Coleman Oven recommended to you will do your work to your complete satisfaction. ***As builders of the world's only complete line of foundry ovens we have no reason to recommend any but the best for your purpose.*** Let our experienced engineers give you practical suggestions for your particular requirements.

WRITE FOR BULLETIN 54



Coleman Tower® Oven

Coleman Transrack Ovens



Coleman Car-Type Core Ovens

Coleman Dielectric Oven

A COMPLETE RANGE OF TYPES AND SIZES . . .
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Circle 576 on Inquiry Card—Page 51

FOR SPEED • FOR FLEXIBILITY • FOR ACCURACY • FOR UNIFORMITY
ANOTHER STEEL FOUNDRY GOES HYDRA-SLINGER!

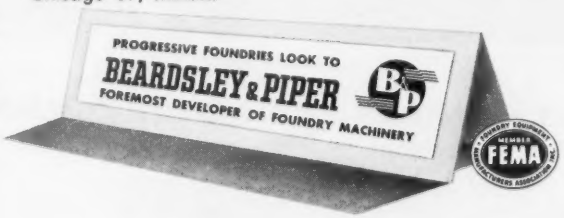
New from the ground up . . . that's the Steel Foundry Division of Texas Foundries, Inc. at Lufkin. It is not only new, but modern in every respect . . . a leading example of foundry mechanization in the growing southwest. It was only natural for management to decide on the Sandslinger method for ramming all of their larger, miscellaneous patterns. And when it came to choosing a Sandslinger, the choice was Hydra-Slinger because the Hydra-Slinger offers all of the quality, speed and uniformity advantages of hydraulic control.

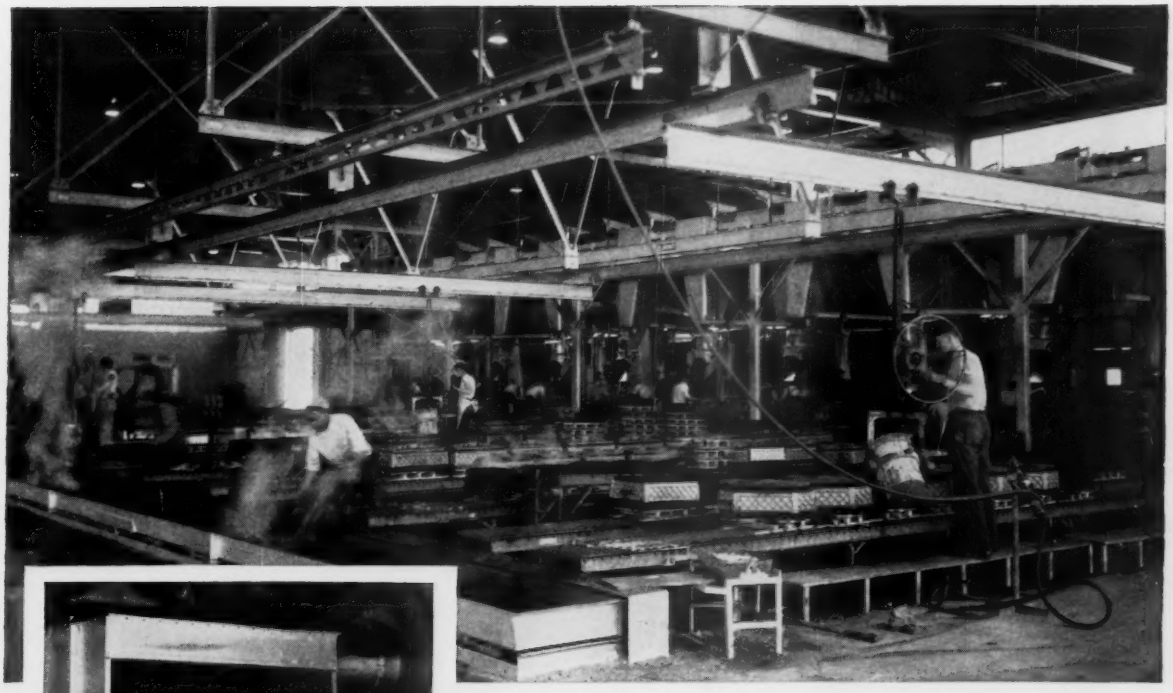
The new Hydra-Slinger is used in conjunction with a loop roller conveyor and rollover machine. Flasks up to 60 x 60 inches are rammed. Nearly all of the patterns are of wooden construction and pattern changes are made easily without interrupting production. Up to 100 large, heavily cored molds are made each day on a single shift.

The slinger operator is located at a control station in the center of the loop, where he has a perfect view of the ramming operation. The location was chosen as best for this installation, although modern Hydra-Slinger design provides a choice of ideal locations for the control station.

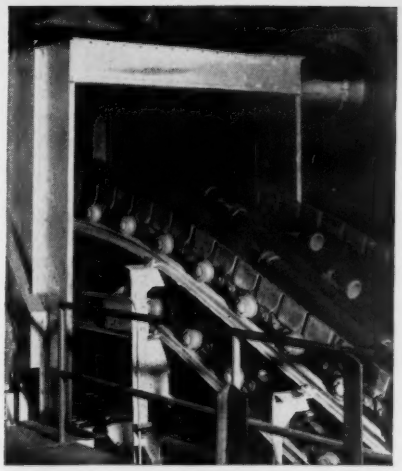
Texas Foundries chose the Hydra-Slinger for their new steel castings plant because it offered a combination of speed, flexibility, accuracy and uniformity unequalled by any other method.

Send for full information today to Beardsley & Piper, Div. Pettibone Mulliken Corporation, 2424 N. Cicero Avenue Chicago 39, Illinois.





Machine-made fittings for cast iron soil pipe are made with a high degree of automation . . . via time-tested Jeffrey foundry equipment.



Jeffrey apron conveyors hustle new Charlotte-Spun® pipe from casting machine to cleaning and inspection facilities.

Charlotte Pipe meets challenge with

automatic pipe foundry

Jeffrey equipment has put soil pipe and fittings production on a fast track at Charlotte Pipe and Foundry Company's new multi-million dollar plant.

Production of cast iron soil pipe and fittings in this plant represents a major advance in foundry techniques. It involves a patented process using centrifugal force to distribute molten iron uniformly within metal molds lined with sand. Electronically-controlled machines produce smooth, seamless, easy-to-cut pipe.

Jeffrey-built sand conditioning equipment, belt conveyors, leakproof apron conveyors and bucket elevators are stepping up efficiency by mechanized movement of sand, pipe and fittings at this new North Carolina foundry.

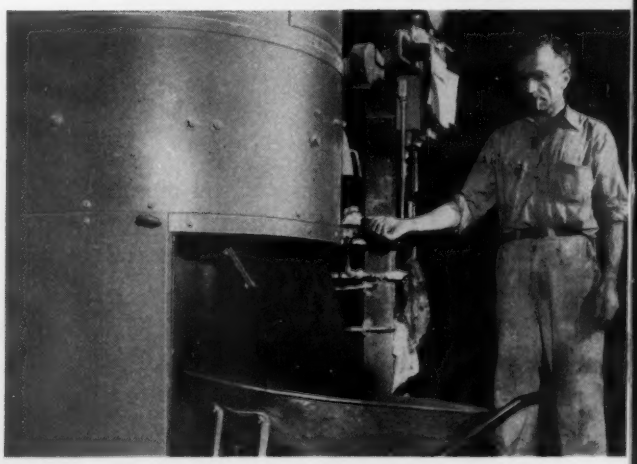
Jeffrey engineering service will help make *your* foundry more productive, more profitable . . . with Jeffrey unit machines or a completely engineered foundry system. The Jeffrey Manufacturing Co., 907 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

CASTING INGENUITY SOLVES MONEL IMPELLER

INDUCTION CAST BY WOLLASTON BRASS



"If the muller were a maintenance problem our operation would be impaired" . . . says E. F. Tibbetts of this No. 1-F Simpson Mix-Muller used to prepare all the green sand at Wollaston Brass and Aluminum Foundry Inc., North Quincy, Mass.

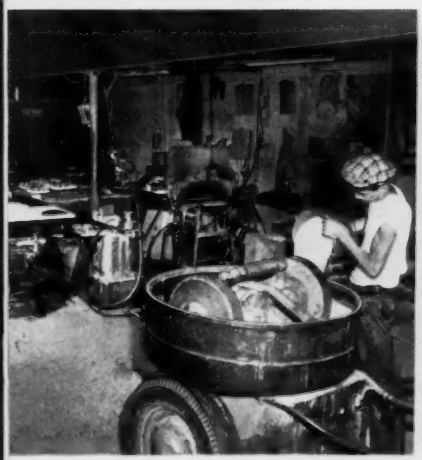
PROBLEM THAT STUMPED PUMP DESIGNERS

SIMPSON MIX-MULLERS contribute to versatility of Wollaston Brass speciality foundry!

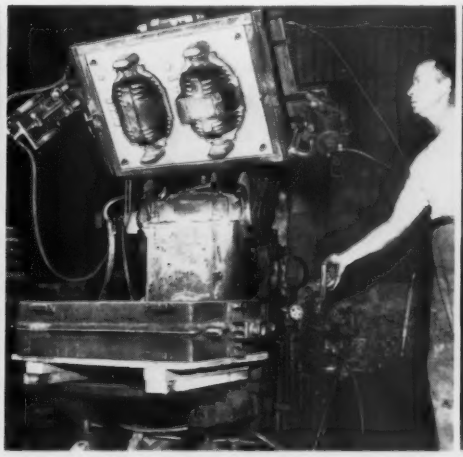
Wollaston Brass and Aluminum Foundry Inc. of North Quincy, Mass. do a brisk speciality jobbing business with a clean, modern and well equipped shop that is set up to handle unusual stainless, monel and nickel jobs. A recent contract, calling for a special high nickel alloy steel pump impeller, was completed by Wollaston—after many foundries, including the pump designer, had found it impossible to produce through their own casting facilities.

Owners Edward H., Frank and R. C. Tibbetts will tell you that careful sand control and precise metallurgy are the secret to Wollaston's unique reputation in producing these specialized jobs. That's why the Simpson Mix-Mullers were put into service upon their recent change-over from natural to synthetic sand. Of their year-old Number 1-F Simpson Mix-Muller E. F. Tibbetts, vice president, of the Wollaston firm has this to say: "*This muller has been in constant use every day since its installation without any difficulty whatever. With continued increase in overall business volume our change-over from natural sand to synthetic has been all the success we hoped for . . . If the muller were a maintenance problem our operation would be seriously impaired. We are glad we decided on a Simpson.*"

Specialized metal jobs may not be numbered among *your problems.* But if you cast metals your sand requires, and will get, the same thorough, efficient *controlled* mulling and the same dependable day-in and day-out service that has made the Simpson Mix-Muller a partner in the progress of improved metal casting—the world over.

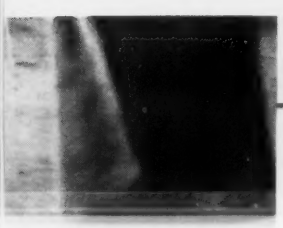


SIMPSON PORTO-MULLER sees heavy duty in preparing all core sand used by this speciality foundry.



CAREFUL CONTROL helps Wollaston Brass maintain an enviable record of success on highly specialized casting jobs.

NO. 1-F MIX-MULLER is equipped with time and labor saving, straight lift Bucket Loader and accurate water additions meter.



NATIONAL Engineering Company

646 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON MIX-MULLERS • SHELL-MULL • MOLDER'S HELPER
TIMEMASTER • SCREENMASTER • COMPLETE ENGINEERING SERVICE

Circle 579 on Inquiry Card—Page 51

Picture of Five Wheelbarrows

What makes an HA PAYLOADER® best for your job?

Shortest turning radius
Higher dumping height
Biggest Bucket (18 cu. ft. payload)
Hydraulic load-shock-absorber
40° bucket tip-back at ground level
Exclusive one-lever bucket control

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

Send data on "PAYLOADER" tractor-shovels
☐ Models HA (18 cu. ft.) and HAH (1 cu. yd.)
☐ Larger models to 2¼ cu. yd.

Name _____

Title _____

Company _____

Street _____

City _____

State _____

56F

Of course you don't see 5 wheelbarrows, but you do see one man on a model HA "PAYLOADER" at the foundry of Domestic Pump & Mfg. Co., Shippensburg, Pa., and the management says it does as much work as 5 men with wheelbarrows handling sand, castings and scrap. Foundries and metal-working plants everywhere like this "PAYLOADER" because it can travel and work where others can't — negotiate narrow aisles, boxcar doors and corners. Yet it boasts a bigger bucket (18 cu. ft. payload) and can dig more, carry more and deliver more tonnage than any tractor-shovel anywhere near its size.

It will pay you to find out what this new style model HA or a larger "PAYLOADER" can do for you. Your nearby Distributor is willing to demonstrate and also tell you about the extra useful attachments — sweeper, fork lift, tine bucket, snow plow, etc. See him today.

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

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TIMEMASTER • SCREENMASTER • COMPLETE ENGINEERING SERVICE
Circle 579 on Inquiry Card—Page 51

Late News

(As of Aug. 26, 1957)

GROWING MARKETS: Results of a survey of industrial buying power by *Sales Management* magazine show that the foundry business still is a pretty lusty youngster, in spite of its ancient origins. Of 76 industries with sales of $1 billion or more during 1956, nonferrous foundries ranked as the third fastest growing with a 37 per cent gain—from $874,000,000 in 1954 to $1,127,000 in 1956. Gray iron foundries, with a 28 per cent increase, were eleventh in rate of growth—from $1,419,000,000 to $1,810,000,000. In the primary metals field, gray iron foundries ranked second in employment with 156,100 employees; nonferrous foundries third with 75,800; and steel foundries fifth with 54,600.

FERROUS CASTING STATISTICS: Ferrous castings statistics, released by the Department of Commerce too late for inclusion in "Foundry Statistics," show the following shipments for May, 1957: Gray iron, 1,112,096 tons, malleable iron 76,504, and steel 164,575. In 1956, shipments for May were, respectively, 1,235,631, 80,138, and 178,227, for drops in 1957 of 10, 5, and 8 per cent. Almost half of the 123,000-ton decrease in gray iron results from lower production of molds for heavy steel ingots. All the decrease in malleable iron is in the standard type. Production of pearlite malleable in May was 13,446 tons, almost 30 per cent higher than during May, 1956.

OBITUARY: Arthur H. Stenzel, 71, retired owner, Stenzel Pattern Works, Houston, Tex., died July 31 . . . C. C. Smith, 80, president, Waukesha Foundry Co., Waukesha, Wis., died Aug. 15 . . . John S. Conway, 51, vice president of sales, Manufacturing & Sales Division, Koehring Co., Milwaukee, died Aug. 17 . . . Charles F. Axelson, 93, founder of Axelson Mfg. Co., a division of Pressed Steel Car Co., Los Angeles, died Aug. 2 . . . Fred J. Coulton, 68, secretary and treasurer, City Pattern Foundry & Machine Co., Detroit, died Aug. 11 in Fort Lauderdale, Fla. . . . Harold H. Johnson, director of research, National Malleable & Steel Castings Co., Cleveland, died Aug. 22 . . . John R. McConnell, former vice president and director of advertising, American Air Filter Co., Louisville, Ky., died Aug. 8.

MORE FOR CASTINGS: Increased costs of labor and materials are pushing up the prices of ferrous castings, according to the Aug. 26th issue of *Steel*. By fall, gray iron, steel, and malleable castings apparently will be from 5 to 7 per cent higher than recent levels. New labor contracts are averaging about 5 per cent increases in gray iron plants, for example, and pig iron has risen about $1.50 per ton in recent months. Consumers are reported to be accepting the higher costs.

PRIMARY ALUMINUM: Production of primary aluminum for July was 142,157 tons, down from the 151,624 produced in July, 1956. Total 1957 production through July is 966,285 tons as compared with 1,011,928 tons for the same period last year. Aluminum producers have raised the price of basic aluminum pig 1 cent per pound, to 26 cents per pound, to cover wage and employee benefit provisions scheduled in union agreements.

PERSONALS: Clyde Frear has retired as production engineer, U. S. Navy, Bureau of Ships, and will engage in foundry consulting practice . . . Daniel R. Chester has been appointed manager, core binders, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland . . . Arthur Vining Davis has resigned as chairman and director of Aluminum Co. of America and has been named honorary chairman by the company's board of directors. He had been associated with the industry since 1888, when he helped to establish Alcoa . . . Robert W. Frank has been elected vice president of Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. . . . A. F. Anzlovar has been appointed vice president and general manager of Mercast Mfg. Corp., La Verne, Calif. . . . Chain Belt Co., Milwaukee, has announced the retirement of Alfred R. Abelt, vice president of sales; Edmund P. Meyer,

State
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SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY
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works manager, Milwaukee plants; and Louis J. Michiel, sales manager, foundries. New appointments include Luther H. Bosnian, senior vice president; William J. Sparling, vice president of manufacturing and facilities; Edward M. Rhodes, general manager, industrial equipment section; and Harold Patzer, sales manager, foundries.

ALUMINUM IN NEW CAR: The auto industry's newest car, the 1958 Edsel, is reported to use approximately 50 lb of aluminum, or 39 per cent more than the average 1957 model. Of this weight, more than three-quarters is in cast functional components. Diecast automatic transmission parts weigh almost 25 lb, and eight aluminum pistons weigh 1½ lb each. The Edsel will make its bow to the public on Sept. 4.

PRICE REDUCTION: Prices of cobalt 60 sources for nondestructive testing have been reduced 50 to 70 per cent by the Atomic Energy Commission. Cobalt 60 is used for radiographic inspection of casting and weldment sections from ¼-in. to more than 10 in.

MISCELLANY: Ampco Metal Inc., Milwaukee, will build a 15,000-sq-ft branch plant at Garland, Tex., a Dallas suburb, at a cost of $200,000. It will be equipped with facilities for sand and centrifugal casting, heat treating, and limited machining operations. Production should begin in early 1958. Ampco also has a branch plant at Burbank, Calif. . . . Gaines Co., Rivera, Calif., light metals foundry, has added a complete tool and die shop and production machine shop to its facilities . . . Ross-Meehan Foundries Inc., Chattanooga, Tenn., is installing more than $100,000 worth of control and research equipment in connection with its steel castings operation . . . Construction of a large addition to the Process Research Building is underway at the Metals Research Laboratories of Electro Metallurgical Co., Division of Union Carbide Corp., Niagara Falls, N. Y. . . . Allis-Chalmers Mfg. Co., Milwaukee, has broken ground for a $3½ million engineering and research laboratory at its Harvey, Ill., works . . . New orders for industrial furnaces during July totaled $4,332,000, or 5 per cent more than the July, 1956, total of $4,140,000.

Prices of Foundry Metals and Coke

(As of Aug. 26, 1957)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	67.00	67.50
Fontana, Calif.	74.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 29.50; tin bronze, No. 225, 39.00; No. 245, 33.50; high-leaded tin bronze, No. 305, 33.50; No. 1 yellow, No. 405, 24.00; manganese bronze, No. 421, 27.00.

ALUMINUM: 99 per cent plus primary ingots 28.10. Secondary No. 12 alloy 22.75-23.00. Deoxidizing grades: No. 1, 24.50, No. 4, 20.75.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 28.50, delivered Connecticut valley.

ZINC: High grade 11.35 delivered. Die casting alloy No. 3, 14.25; No. 2, 15.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$49.00–50.00	**$54.00–55.00	.....	.....	.....	.....	69.00–70.00
Boston*	**41.00–42.00	**34.00–35.00	.....	.....	**42.00–43.00	.....	.....
Buffalo	49.00–50.00	**48.00–49.00	.....	.....	**53.00–54.00	.....	66.00–67.00
Chicago	54.00–55.00	46.00–47.00	.....	52.00–53.00	52.00–53.00	60.00–61.00	74.00–76.00
Cincinnati*	**52.00–53.00	**45.00–46.00	**42.00–43.00	.....	**55.00–56.00	.....	**71.00–72.00
Cleveland	52.00–53.00	53.00–54.00	41.00–42.00	54.00–55.00	56.00–57.00	61.00–62.00	75.00–77.00
Detroit*	**51.00–52.00	**51.00	**42.00	**52.00	.....	**53.00	.....
Los Angeles	46.00	**53.00	.....	.....	.....	.....	.....
New York*	50.00–51.00	46.00–47.00	46.00–47.00	.....	.....	.....	.....
Philadelphia	52.00	47.00	53.00	.....	57.00	62.00	69.00–71.00
Pittsburgh	55.00–56.00	49.00–50.00	47.00–48.00	.....	59.00–60.00	.....	75.00–77.00
St. Louis*	49.50	48.00	42.00	48.00	.....	.....	77.00
San Francisco	47.00	53.00–54.00	40.00	55.00	53.00	.....	.....
Seattle	44.00	40.00	37.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

For Cleaner Surfaces, Better Shakeout, Try WHITEHEAD'S NEW HYGEIA LYQUAFLOUR

Our new plant at Irwin, Pa., is producing the improved DUSTLESS DOUBLE STRENGTH HYGEIA LYQUAFLOUR. This compound of a special hydrocarbon and woodflour improves castings and mold conditions for all types of metal. Highly recommended for the advantages listed below:

- One sand additive controls both peel and expansion
- Good shakeout saves sand
- Imparts highest flowability to sand mixture to give pattern true finish
- 2% initial treatment of sand and as little as ¼ of 1% to reactivate does the job
- Replaces any carbon or hydrocarbon materials now used
- Eliminates dust at the muller
- Castings peel excellently which reduces cleaning room time
- Reduces penetration and burn-on
- Overcomes sand expansion defects, maintains good compression strength
- Improves molding, "feel", and "moldability"
- No rigid control required
- Permits hard ramming
- Less ramming required, more molds per hour
- Less temper water needed

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of

LYQUAGRIP
Ready-to-use core paste

DUO RESIN
Binder for baking with controlled oven temperatures

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

Circle 581 on Inquiry Card—Page 51

AUTOMATIC AIR-TO-AIR CONTROL assures

#21 Type "C" Airomatic Automatic Drag Molding Unit

Heavy Duty Jolt & Power Squeezer Drag Molding Machine with Pneumatic Pattern Draw. Equipped with air operated car type squeeze head and built-in flask roll-in and mold roll-out device with measuring sand hopper, flask indexing device and sand spill upset, flask feed-in elevator, mold turn-over and mold transfer.

uniform jobs

dependable jobs

better jobs

at less cost

in the

NEW

NICHOLLS AIROMATIC

AUTOMATIC MOLDING MACHINES

There is nothing to get out of order — no limit switches, no electrical timers, no electric pressure switches, no electrical latch relays.

With simple, reliable "push-button" operation the new Nicholls Airomatic utilizes the driving force of the machine itself to make, close, remove and return **high-quality** sand molds **in quantity . . . automatically . . . consistently . . . continuously.** No guesswork, no wasted materials, no lost manhours, no bottlenecks.

Look at **your** equipment **today.** Whatever your molding requirements, there's a Nicholls machine to fit the job. For information, call or write

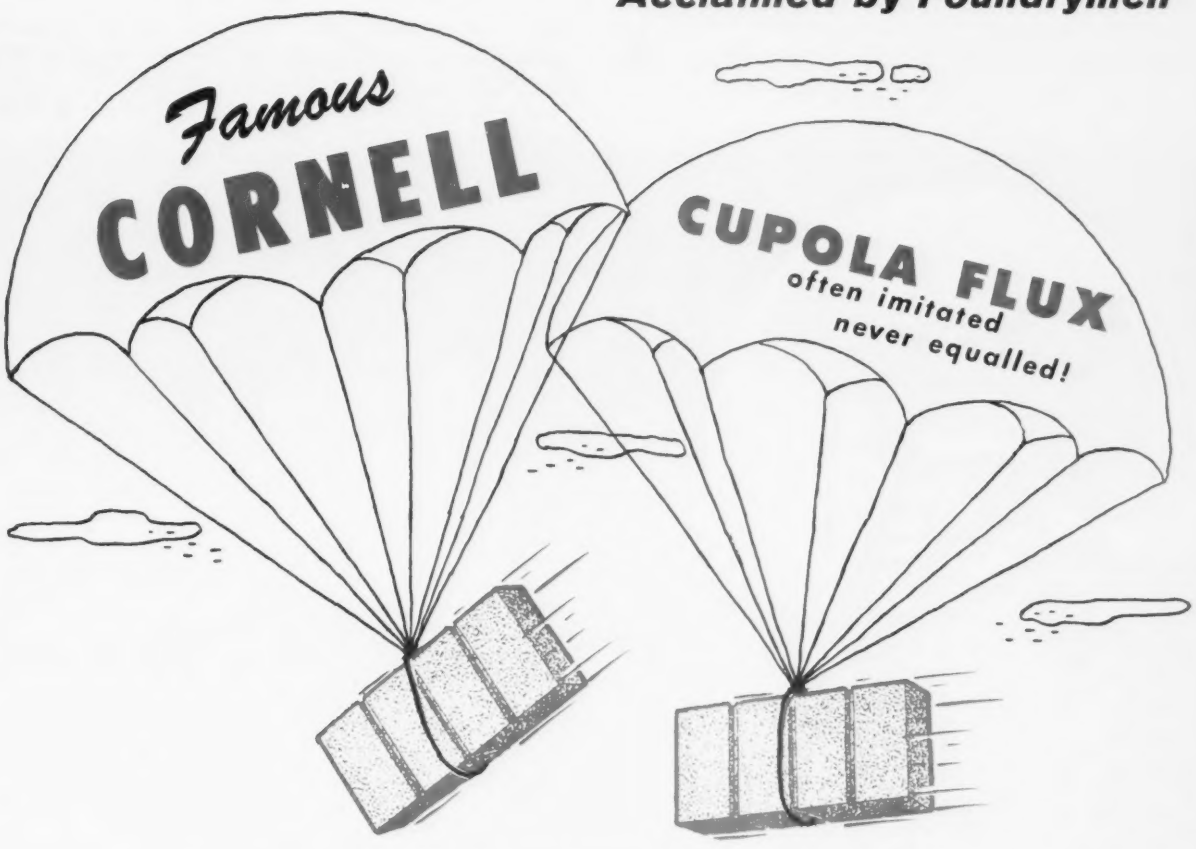
WM. H. NICHOLLS CO., INC.
Richmond Hill 18, Long Island, N. Y.

NICHOLLS

• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT

FIRST IN EVERY TEST

Acclaimed by Foundrymen



Famous Cornell Cupola Flux produces a cleaner metal with greater fluidity. Hundreds of foundries now use Cornell Flux because this superior flux introduces efficiency in cupola operations. Why don't you investigate Cornell Flux today!

IF YOU MELT **ALUMINUM** OR **BRASS...Try *Famous* CORNELL Aluminum or Brass Flux**

Write for Bulletin 46-A

The* CLEVELAND FLUX *Company

1026-40 MAIN AVENUE, N.W. • CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

SAN-BLO cuts costs....

Continental Foundry & Machine Company uses a model "250" SAN-BLO Core Blower, SAN-BLO "ROL-O-DRAW" and conveyor loop to form an unbeatable team for reducing costs of making large cores in its steel jobbing foundry. *Twelve different* core boxes are run in *frequently changed sequences* to meet casting requirements, and quickly drawn on the "ROL-O-DRAW", which forms part of the loop.

The SAN-BLO's universal blow plate makes this unusual

San-Blo Division

on large cores, too!

flexibility possible—assuring uninterrupted production on these twelve boxes by *eliminating* the changing of blow plates. Blow hole arrangements in the twelve boxes vary to some degree. But, they are similar enough for the same blow hole pattern in the universal blow plate to satisfy the requirements of each box. When different blow hole arrangements are required for *other* core boxes, the blow hole pattern in the blow plate may be changed *without* dropping the sand in the sand chamber.

The SAN-BLO will blow molding sand, oil sand and resin bonded sand with maximum efficiency and is equipped with "Pulsator" and "Low Pressure Prefill" units for blowing wooden boxes safely, with negligible wear. There's no other core blower with the cost reducing potentials of the SAN-BLO! So, why not find out what it will do for *your* core room problems? Write us about them, today!

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET • CLEVELAND 5, OHIO A SUBSIDIARY OF ARCHER • DANIELS • MIDLAND COMPANY

Circle 584 on Inquiry Card—Page 51

99.9% PURE SILICA
WEDRON
SILICA COMPANY
INDUSTRIAL SAND

This extensive deposit plus scientific processing assure you the finest rounded grain pure silica sand for foundry use

24 standard grades in regular production

The chances are better than ever that your foundry operations now require high quality, more exact sand grades than they used to. With the new casting methods now used, sand is critical. It has to be pure, uniform and of a certain exact grade.

This close control of sand quality is only possible in a scientific sand processing plant such as Wedron's. Every step in the process is controlled to give users consistently high quality sand with these facilities. Wedron regularly produces 24 separate grades of sand as standard. From these grades it is possible for most users to choose a sand which will meet most any requirement. Where necessary, Wedron can produce special sand grades to customer specifications. A considerable amount of our regular production is in these special grades.

The Wedron sand deposit itself has special plus values for foundry users. Wedron sand is a pure, rounded grain silica with high heat and chemical resistance. It is highly desirable for foundries because it greatly reduces cutting out of core boxes and produces a smoother casting surface, grade for grade.

In many ways, Wedron is your best bet for foundry sand. Make your next order Wedron . . . for the best foundry sand available.

NEW SAND BOOKLET

This new booklet gives all the details on Wedron Sands for all kinds of industrial uses. Complete descriptive folder details the Wedron processing operations which produce the finest rounded grain silica sands. 24 separate standard grades are tabulated and chemical analysis of sand is given. Numerous illustrations of the Wedron plant and facilities are shown. Send for your copy today!

WEDRON

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT
WEDRON SILICA COMPANY
135 South LaSalle Street, Chicago 3, Illinois

Circle 585 on Inquiry Card—Page 51

1. COOLING

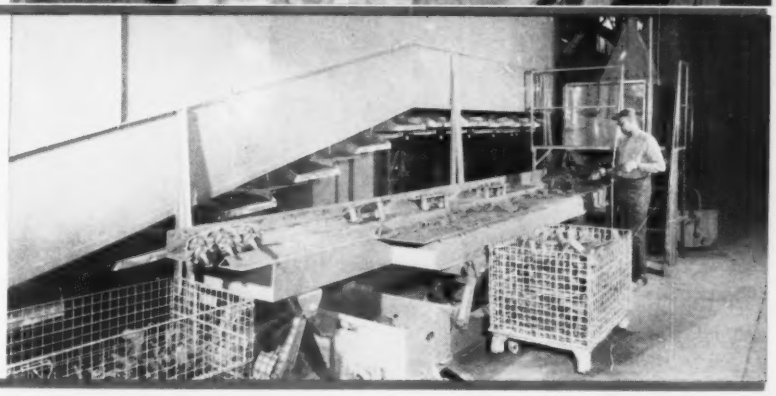
After the pour, castings, molds and backing sand are automatically discharged from trolley conveyor into this 36-in. wide Torqmount conveyor—first in system of Link-Belt oscillating conveyors. Material travels at 10 fpm to facilitate cooling.

2. SCREENING

This 8-ft. screening section, with ⅜-in. diameter openings, efficiently screens off backing sand and finer particles of mold sand. Lower trough of the conveyor carries the sand to bucket elevator discharging to belt conveyor delivering to storage bin.

3. SORTING

Last 21 ft. of oscillating conveyor system serves as a sorting table. A divider channels the material to one side where it can be easily sorted by one man. Castings and sprues are collected in wire baskets for further cooling, and refuse sand drops into a tote box.



LINK-BELT Torqmount oscillating conveyors unite all 3 in

one continuous sequence

From shakeout to sorting—Link-Belt Torqmount oscillating conveyors provide gentle, continuous handling at this highly mechanized shell mold foundry. Combining *positive action* and *natural frequency*, they move hot castings from the shakeout smoothly through cooling, screening and sorting . . . hold manual labor to a minimum . . . assure safe, clean working conditions.

Link-Belt can add new economy and efficiency to *your* castings production. Whether you need one machine or complete engineering, call your nearest Link-Belt office. *NOW*—36-in. wide oscillating conveyors are available from *STOCK*. Get Book 2423 for full facts on Link-Belt's broad line of foundry equipment.

14.065

LINK-BELT

OSCILLATING CONVEYORS

MEMBER FEMA

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

Circle 586 on Inquiry Card—Page 51

Large and intricate cores are cured in minutes with the

New Sodium Silicate-CO_2 Process

Elimination of oven baking speeds production ...cuts costs

Only a few minutes are required to cure green cores when the new sodium silicate-carbon dioxide process is used. Cores and molds are ready for the metal pouring line immediately after CO_2 curing. No time-consuming oven baking is required. The production cycle is faster . . . costs are lower.

In one foundry, six baking ovens were scrapped after the sodium silicate-CO_2 technique was given a trial. Another foundry reports that an overall cost saving of 21% has been achieved since switching from oven curing to the CO_2 process.

In addition, foundries using the new system find that CO_2-cured cores resist breakage, hot tears and cracks . . . can be made to extremely close tolerances. Foundry personnel like the new process because it has no toxic fumes or objectionable odors.

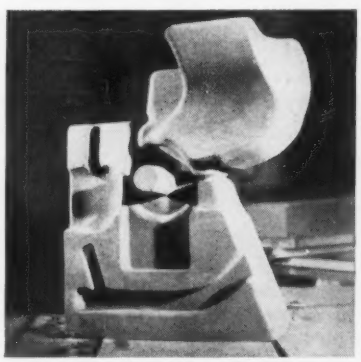
High-quality Du Pont sodium silicate is available in formulated products for CO_2 systems from foundry supply houses throughout the country.

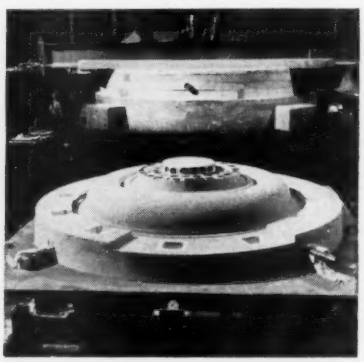
Binder formulations vary for specific needs and foundrymen prefer to rely on the advice of their foundry supply representatives for recommendations.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Grasselli Chemicals Department
Wilmington 98, Delaware

Fine core sand and a binder based on Du Pont sodium silicate are mixed thoroughly in a standard muller (left). Mixture is hand-tamped into form (right) then packed tightly with pneumatic rammer.

Core maker prepares to inject core with carbon dioxide (left). In the chemical reaction that results, the silicate is converted into a strong gel that binds sand grains together firmly. Cured core (right) is strong, yet will collapse easily after casting.





Intricate core for an automotive casting (left) is cured and ready for the metal pouring line in 2 to 3 minutes. Core for large industrial torque converter (right) is cured and ready for use in a few minutes. Oven curing would take several hours to do same job.

DU PONT
REG. U. S. PAT. OFF.

SODIUM SILICATE

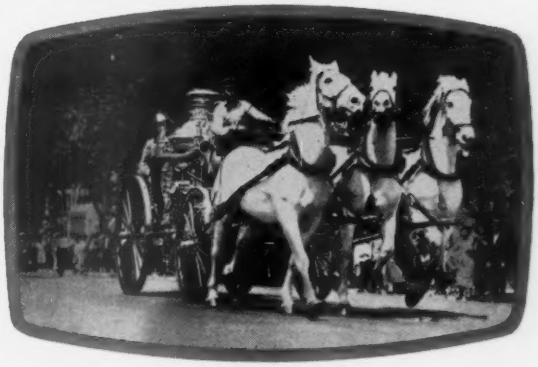
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

SEE TIMKEN TELEVENTS ON NETWORK TV

Two big hour-long spectaculars this fall

Over 126 NBC STATIONS, SEPTEMBER 23rd

"Eleven Against the Ice", the story of the Antarctica Turnpike. See men and machines build a trail across Antarctica's frozen wastes—in spite of 200 mph winds, temperatures of 120 degrees below zero and crevasses big enough to swallow a 20-story building. It's a triumph of engineering and human courage, a whale of a television show.

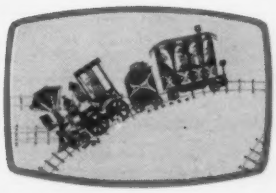


Over 142 NBC STATIONS, NOVEMBER 21st

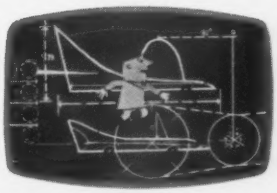
"The Innocent Years". Recaptured from exciting old films and newsreels, you'll see happy days relived. Experience the excitement of "Teddy" Roosevelt, Thomas Edison and Mark Twain in action. Hear songs like: "In the Good Old Summertime", "He'd Have to Get Out and Get Under". Enjoy the fun of family picnics, the joys of people in the last untroubled time in our history.

And commercials that help you sell . . .

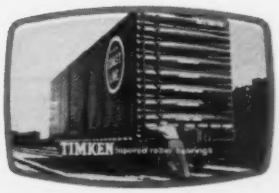
See How man stumbled on the concept of the wheel.



See Why America's railroads have always led the world.



See Why Americans jump for the latest thing in cars.



See One man push a freight car all by himself.

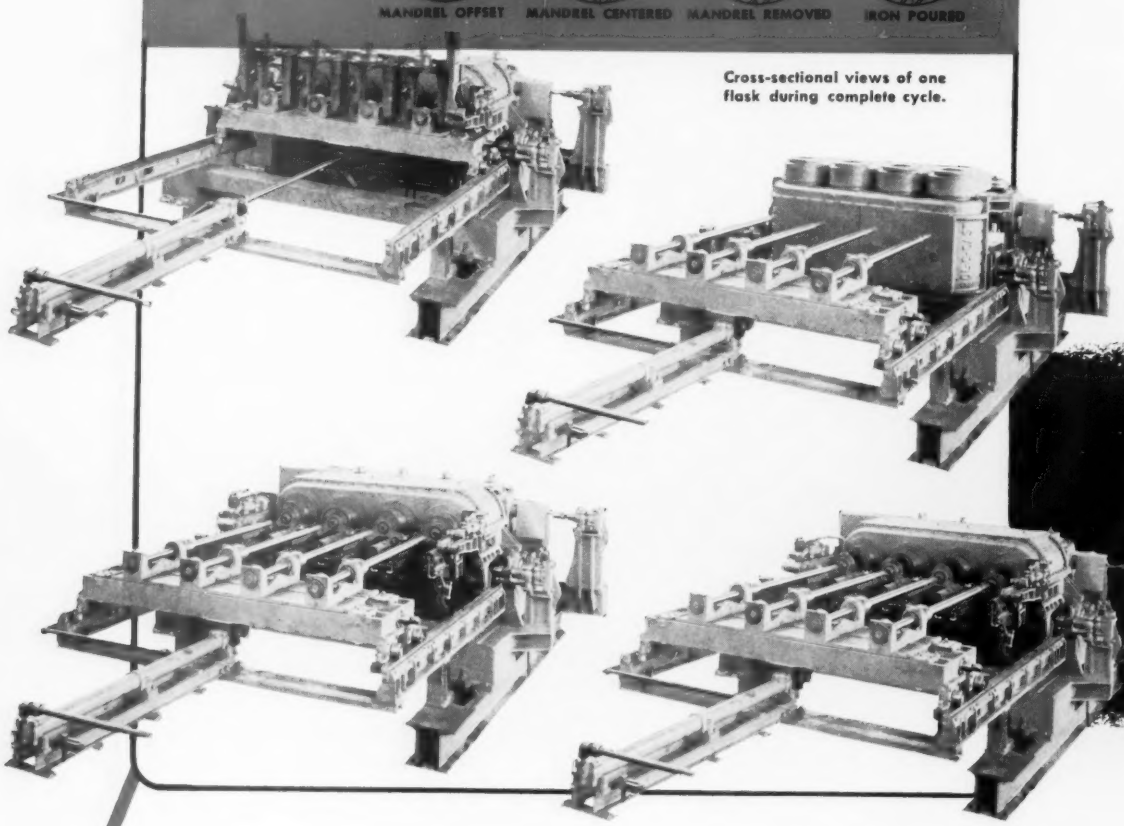
Years of national and trade advertising, backed by their superior performance, have made "Timken" the best-known name in bearings—a name that helps to sell the products that use Timken® bearings. Now, network television will build even a greater awareness of Timken bearings—make them an even bigger sales plus in the equipment you sell. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN TAPERED ROLLER BEARINGS

TRADE-MARK REG. U. S. PAT. OFF.

Circle 588 on Inquiry Card—Page 51

Cross-sectional views of one flask during complete cycle.



Rol

why foundrymen buy a

Seventh of a Series

The Herman Rol-O-Cast machine illustrated here is a revolutionary development in centrifugal casting, as evidenced by current production achievements.

Every hour on a maintained production basis, 136 five-foot lengths — or more — of 4-inch diameter, cast-iron soil pipe are turned out on each Rol-O-Cast machine.

An ingenious electronic control system is the key to this HERMAN development . . . it automatically directs 25 timed sequences in each complete cycle of operation. Manual effort is reduced to a minimum — one man supervises the controls and sets the hub cores, two men pour and two men remove the pipe.

The simple sketch at the top of the left-hand page gives a quick explanation of what the process involves.

-O-Cast.....the HERMAN Centrifugal Casting Machine

There is a type and size Herman Molding Machine for all foundry operations.

HERMAN molding machine

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

Circle 589 on Inquiry Card—Page 51

INTERNATIONAL TYPE

Castings improved 6 ways with one compound

...CALCIUM CARBIDE!

New calcium carbide injection process:

- **reduces sulfur content**
- **helps eliminate shrinkage porosity**
- **increases machinability and prolongs machine-tool life**
- **reduces chill**
- **increases fluidity**
- **promotes uniform hardness throughout castings**

Section of untreated casting

Section of treated casting

An example of how a calcium carbide graphite treatment transformed type D and E graphite to type A graphite. This innoculation effect from carbide treatment produces graphite structure which results in sounder iron with greatly improved machinability characteristics.

With the injection of one compound, calcium carbide, modern foundries are improving castings, and reducing scrap without changing the base composition of the iron.

It will pay you to further investigate the advantages of calcium carbide injection. The services of Airco Technical men are available to you. They will help you plan and install a calcium carbide injection process tailored to your plant and production requirements. Such installations for carbide treatment can be made completely automatic for any foundry operation. Write to Airco at the address below for complete information.

Airco Fluidizers embody all the latest engineering advances for injecting carbide into molten metal.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

AIRCO

Offices in most principal cities

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated
150 East 42nd Street, New York 17, N. Y.

On the west coast —
Air Reduction Pacific Company

Internationally —
Airco Company International

In Cuba —
Cuban Air Products Corporation

In Canada —
Air Reduction Canada Limited

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetate, alcohols, and other synthetic resins.

Circle 590 on Inquiry Card—Page 51

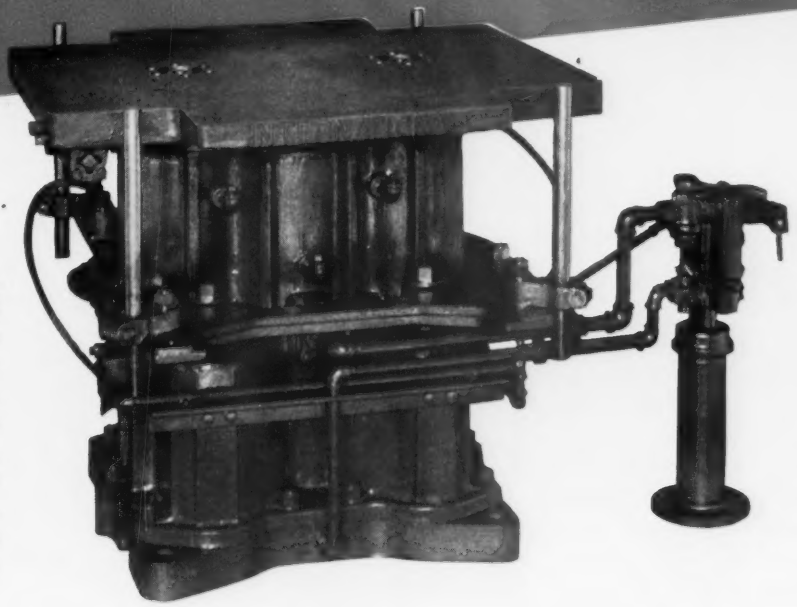
Circle 591 on Inquiry Card→

INTERNATIONAL TYPE

JDP MACHINE

The JDP has the exclusive Double Jolt Feature. A **Positive** Jolt and a **True** Ram.

TWO JOLT SECTIONS combined in one integral unit.



The JDP is adaptable to a large range of work, suitable to the pin lift style. It is readily adjustable. The incorporation of the Double Jolt Feature, combined with the sturdiness of the machine, gives a positive ram throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. Wearing parts can be readily replaced.

The JDP MACHINE

by

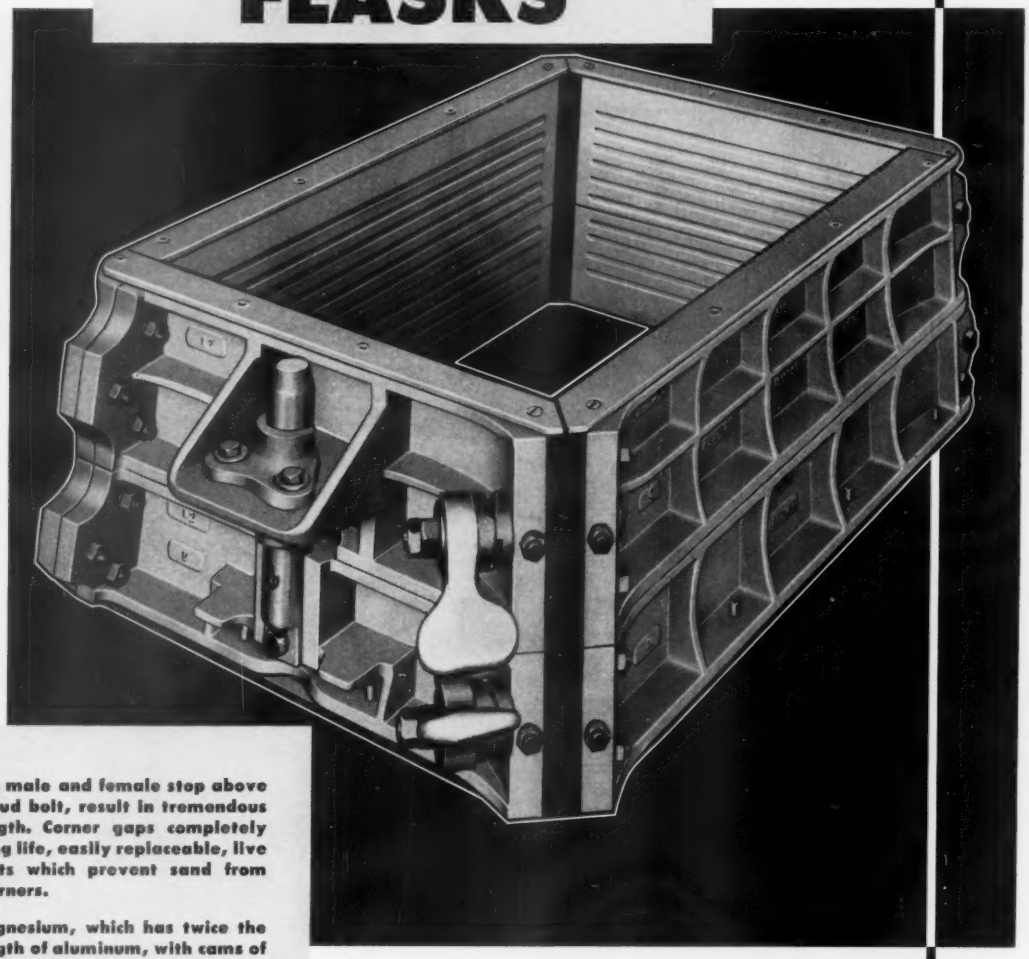
INTERNATIONAL

International Molding Machine Company • La Grange Park, Illinois

No Other Flask Gives You All These Advantages

sturdy

Fremont SPREADLOCK FLASKS



■ **Two-piece male and female stop above and below stud bolt, result in tremendous corner strength. Corner gaps completely closed by long life, easily replaceable, live rubber inserts which prevent sand from lodging in corners.**

Made of magnesium, which has twice the tensile strength of aluminum, with cams of hardened steel forgings, the Spreadlock assures long service.

Magnesium weighs ⅓ less than aluminum, so they are light in weight, easier to handle.

Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure exacting work.

Write today for free literature and prices.

The Fremont FLASK Co.

FREMONT, OHIO

- fast core bake
- improved workability
- consistent uniformity
- high tensile value
- high scratch value
- less gas evolution
- controlled viscosity
- safe over-bake properties

THIEM core oils have that *all important* PLUS INGREDIENT of scientific formulation that helps speed foundry operations — reduce losses. Thiem laboratory technicians CUSTOM-FIT core oils to your foundry practices. They work with Thiem field men as a team to give you that extra measure of assurance of producing better castings at low cost. Write us — Thiem laboratory technicians are always at your service.

SERIES QB (QUICK BAKE)

LOWEST OIL TO SAND RATIO—SAFE BAKING CURVE — HIGH TRANSVERSE VALUE. Higher tensile and scratch values per volume of oil. Faster bake with safe over-bake properties. Cores safely withstand production handling — low breakage.

Best by Test

SERIES 100

Low price, uniform oils for general purposes, usable over wide temperature ranges.

SERIES 400

High tensile strength, fast baking oils for increased production, readily adapted to your overall needs.

ENGINEERED

Oils for highly specialized applications to produce cores for shallow jackets, radiators, stoves, etc.

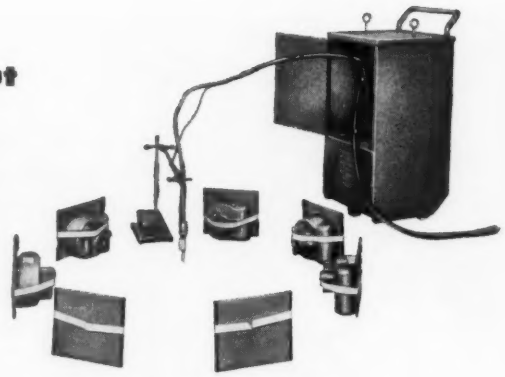
Thiem PRODUCTS, INC., MILWAUKEE 19, WISCONSIN

Manufacturers of foundry products exclusively — Ferro Kote • Krome Kote • Dri Lite • NF-100 • No Dri G-128 • Mold Lite • Krome Kote Z • Krome Kote NF • Core Oil • Mudding Compound • Chill Kote • Core-Hesive Core Paste • Synol • Satin Kote.

Circle 593 on Inquiry Card—Page 51

some people have queer notions about

RADIOGRAPHY WITH ISOTOPES



Here's a typical multiple-specimen setup . . . seven castings radiographed simultaneously with a T.O. model 402 panoramic Cobalt 60 unit.

Many a plant, uneasily aware that it is missing the profits of radiographic inspection, still holds back for one mistaken "reason" or another. Here are some we run into . . .

"out of my league" . . . *costs too much*

Not so. An iridium 192 machine costing as little as $1700 may be fully adequate to your needs. *Indeed, average equipment cost is less than $2500.*

needs a *specialist* to run

On the contrary, a practical on-the-job training course in our Cleveland laboratory (free tuition to buyers) equips any intelligent employee with all he has to know.

takes forever to make a radiograph

Not so. You can x-ray 1" steel in 30 seconds, 3" sections in 4 minutes with the Cobalt 60 sources available today.

gamma radiographs are no good

Not so. If you use the right source for the right job you'll have no trouble getting the 2% detail sensitivity required by exacting inspection codes.

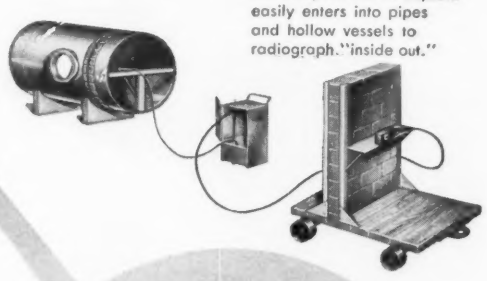
it's dangerous; we're afraid of it

No reason to be: Technical Operations modern equipment is safe and simple-to-handle.

not for me; my stuff is different

We don't know what *your* business is . . . but if *whatever* you make (or buy or sell) needs "seeing into" for quality control, radiography (either gamma or x-ray) can profit you as it does others — *your competitors included.*

The compact source capsule easily enters into pipes and hollow vessels to radiograph "inside out."



costs nothing to find out

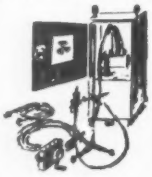
what radiography can do for you. Simply call in your local Picker representative* or write us outlining your problem (and if possible, sending typical samples). We'll make tests and tell you frankly whether radiography holds any promise for you. Because Picker offers *both* x-ray and isotope equipment, we have no axe to grind for any particular method.

There's probably a Picker district office near you (see local 'phone book)

PICKER X-RAY CORPORATION
25 South Broadway, White Plains, N. Y.

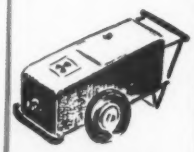
SOME OF THE TECHNICAL OPERATIONS GAMMA RADIOGRAPHY UNITS MARKETED AND SERVICED BY PICKER X-RAY

TO412A
Iridium 192 Unit



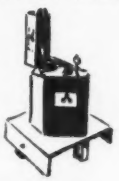
TO402
Cobalt 60 Unit

TO404
Cobalt 60 Unit



TO446
Cobalt 60 Unit

TO405
Iridium 192 Unit



TO416
Source Changer

one stop for everything in Picker x-ray **radiography and fluoroscopy**

Circle 594 on Inquiry Card—Page 51

Reader Information Service

FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 212 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FURTHER INFORMATION on Advertised Products ?

September 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626
522	537	552	567	582	597	612	627
523	538	553	568	583	598	613	628
524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
532	547	562	577	592	607	622	637
533	548	563	578	593	608	623	638
534	549	564	579	594	609	624	639
535	550	565	580	595	610	625	640
641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
648	663	678	693	708	723	738	753
649	664	679	694	709	724	739	754
650	665	680	695	710	725	740	755
651	666	681	696	711	726	741	756
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653	668	683	698	713	728	743	758
654	669	684	699	714	729	744	759
655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
775	790	805	820	835	850	865	880

EXTRA COPIES OF ARTICLES ?

FILL IN PAGE NUMBER AND TITLE OF ARTICLES DESIRED

Page No.	Title of Article
.....	.....
.....	.....
.....	.....

This card good in U.S. and Canada only—Expires Nov. 15, 1957

NAME .....

POSITION .....

FIRM .....

STREET .....

CITY ..... ZONE.....

STATE .....

PRODUCT MANUFACTURED .....

FURTHER INFORMATION on Advertised Products ?

September 1957

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524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
532	547	562	577	592	607	622	637
533	548	563	578	593	608	623	638
534	549	564	579	594	609	624	639
535	550	565	580	595	610	625	640
641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
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644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
648	663	678	693	708	723	738	753
649	664	679	694	709	724	739	754
650	665	680	695	710	725	740	755
651	666	681	696	711	726	741	756
652	667	682	697	712	727	742	757
653	668	683	698	713	728	743	758
654	669	684	699	714	729	744	759
655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
775	790	805	820	835	850	865	880

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FOUNDRY

Reader Information Service

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 212 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FIRST CLASS
Permit No. 36
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BUSINESS REPLY CARD
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Reader's Service Dept.

No other single machine performs such a variety of operations in one set-up

It takes several machines to do all that's now possible with just one BOKOE No. 3 Universal Milling and Boring Machine. Because no other machine combines all these versatile features—for non-ferrous, cast iron and alloy steel tooling, patterns and production to close tolerances:

Large work table and deep throat handles many jobs in one set-up. Easily accessible for bulky parts up to 8′ 2″ dia.; distance between column slide and spindle center 37½″. Automatic controls on work table provide 28″ traverse and 55″ longitudinal movement; table feeds infinitely variable from 4″ to 39″ per min.

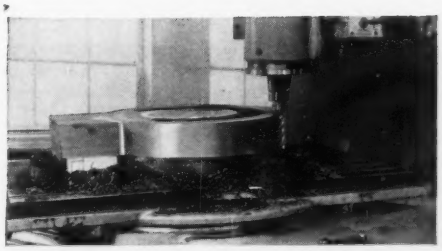
Circular milling with automatic power feed for circular movement of work table infinitely variable from 7″ to 70″ per min. (at a diameter of 40″), for continuous rotary milling as well as for radius milling.

Variable speed changer with spindle speeds from 36-1800 rpm can be operated without stopping machine.

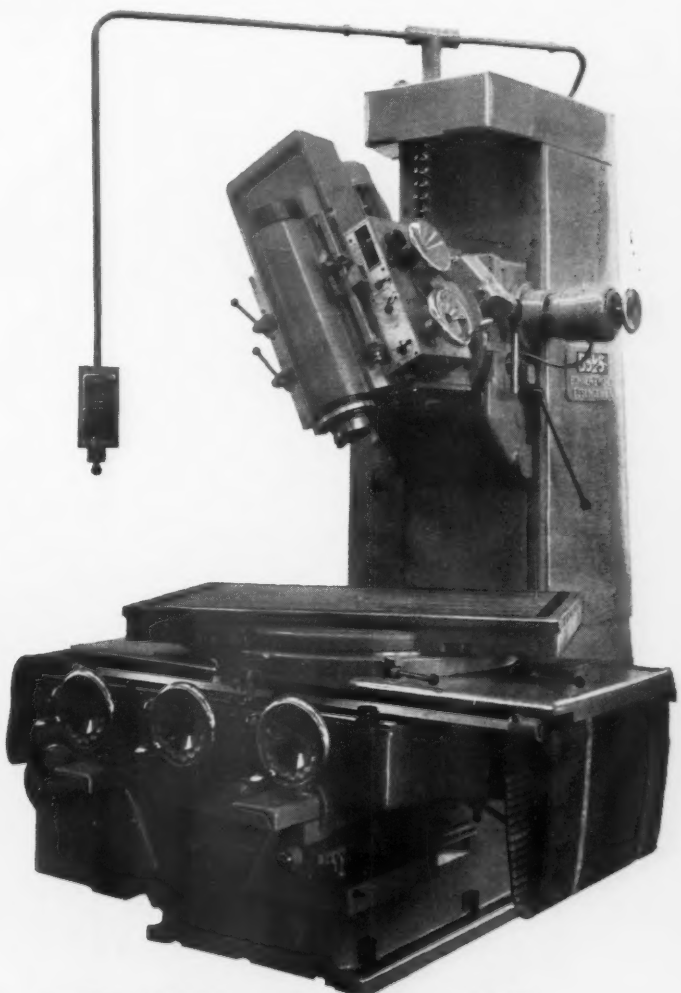
Swiveling column turns 180° horizontally in either direction . . . permits radial drilling in addition to vertical milling, universal milling and boring up to 11⅞″ with large milling slide; six mechanical feeds and rapid travel. Milling head on column swivels vertically 90° in either direction.

Get to know the big BOKOE No. 3—how it is doing the work of several machines . . . more economically . . . for such companies as Convair (4); Ford (3); Motor Pattern (7); General Electric, Lockheed, General Motors and hosts of others. **Write for complete details.**

you'd need several machines to do all the different jobs you can produce on one BOKOE universal miller



Built-in circular table with power feed and tilting milling head is ideal for bulky work pieces. Also in smaller Model No. 2.



KO CO., INC PRECISION MACHINERY

KURT ORBAN COMPANY, INC.

38 Exchange Place, Jersey City 2, N.J. • In Canada: 2490 Eglinton Ave. W. Toronto

YOU NAME IT...'TUGIT' CAN HANDLE IT *AT ANY ANGLE*

The lifting and pulling jobs 'Tugit' does easily every day are countless. It's geared like the most efficient chain block but is built for use at any angle, anywhere. The small size weighs a mere 16½ lbs. but can lift or shift a 1-ton load with only a 40-lb. pull on the handle. That's 36% less effort to handle capacity loads than the average ratchet-lever hoist requires. It lifts and lowers smoothly even in tight spots where no regular hoist will fit. Loads can be moved as little as 3/32" when accurate spotting is a must.

Every 'Tugit' part is built tough for extra safety. The handle can't kick back. The hooks open slowly under overload — give visible warning of danger. Feature for feature, 'Tugit' is today's best value in portable lifting and pulling tools. 1 and 2 ton capacities available. Both are tool-box size. Prices start at $63.50. *Ask your "Shaw-Box" Distributor for a demonstration or write us for Bulletin 388.*

'TUGIT' DOES ALL THESE JOBS AND THOUSANDS MORE

Assembles parts . . . closes freight car doors . . . stretches cable . . . pulls pipe together . . . handles heavy repair parts . . . moves machinery . . . lifts furnace covers . . . joins conveyor belts . . . unearths posts and stumps . . . erects fences . . . hauls boulders . . . lifts truck tires . . . installs overhead equipment . . . straightens frames . . . positions motors . . . closes hopper doors . . . operates valves . . . tightens power lines . . . booms poles and pipes to trucks.

Safety Hooks can be provided on 'Tugit' to "lock in" slings and other attachments used to support loads.

'Tugit' Carrying Case. Durable dust-tight canvas, sewed and riveted to wooden base plate. Has slide fastener and leather handle. Makes 'Tugit' easy to transport from job to job.

57 B-7

MAXWELL MANNING & MOORE INC. MM&M TRADE MARK

'Tugit'® HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

386 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

Quality castings begin with truly uniform **PENN-SAND**

PENN-SAND products are supplied by the Pennsylvania Glass Sand Corporation, the nation's leading producer of quality silica sands since 1868. There is a grade of PENN-SAND ideally suited for every foundry application.

MOLDING SAND

CORE SAND

SHELL-MOLDING SAND

SANDBLAST SAND

SUPERSIL SILICA FLOUR

PENN-SAND

THE SURE START TO A PERFECT FINISH

Triple washing, multiple screening and rigid testing *before* shipment assure the perfect uniformity of each grade of PENN-SAND—shipment after shipment.

By using truly uniform PENN-SAND, you can standardize your mixes. As a result, you save the time and money normally spent to change mixes every time a car of sand is received. Further, you will find your cleaning costs reduced and your production of scrap castings cut considerably.

Whether you use core oil, bentonite, one of the new cold-set resins, or the CO_2 process, there is a grade of PENN-SAND that will help you produce better castings at lower cost. For complete information and free samples, write to Pennsylvania Glass Sand Corporation, Two Gateway Center, Pittsburgh, Pa.

Nation-wide Shipping Service from Seven Plants

BERKELEY SPRINGS, W. VA. • MAPLETON, PA. • McVEYTOWN, PA.
NEWPORT, N. J. • KLONDIKE, MO. • PACIFIC, MO. • MILL CREEK, OKLA.

Circle 597 on Inquiry Card—Page 51

AMASTEEL

THE FIRST NAME IN QUALITY

CAST STEEL ABRASIVES

ALLOY METAL ABRASIVE CO.

FIRST PRODUCER

Pioneered and lead the way both in development and production of quality cast steel abrasives.

FIRST IN QUALITY STANDARDS

Developed and produced the only equipment which does accurately test and prove hardness and life values also peening value (according to Almen Strip Standards) also surface distortion characteristics on specimens for profilometer standard readings for any and all types of blast-materials.

FIRST IN SCIENTIFIC STANDARDS

Installed and maintains complete chemical, physical and micro lab equipment which is used for production standards and is available for furnishing data to users and potential users.

FIRST IN PRODUCTION FACILITIES

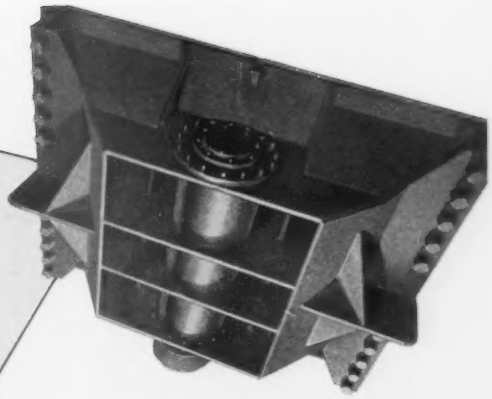
Installed and maintains complete and most modern electric melting, processing, heat treating and packaging equipment to insure users service and satisfaction.

Write for FREE Bulletin on "Buying Engineered Abrasives."

ALLOY METAL ABRASIVE CO.

121 South Division Street, Ann Arbor, Michigan

it's the
EXTRA WEIGHT
that
Slashes Knockout Time



"FOUNDROMATIC" SHAKEOUT

This view of the *Foundromatic* shakeout from below shows what we mean by heavy duty construction. Look at the sturdy deck supports and heavy tubular steel spacer, all welded integral with body and deck. Construction like this, of course, adds years to shakeout life, but more than that—it *provides the reserve weight* that assures rapid knockout of cores and shakeout of flasks. The *Foundromatic* shakeout weighs more than 40% of its rated capacity — and that's all the weight you'll ever need for a fast, clean operation.

For complete information, see your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin O7B6365B.

New Control Replaces Mechanical Snubbers... Assures Smooth Stop

Single control features two timers. When "stop" button is pressed, the first timer allows shakeout to coast down to one-third operating speed. This timer then energizes contactor which reverses current. This reversal of current through motor carries shakeout quickly through critical amplitude range. Stopping is smooth. Second timer shuts off current before motor can reverse direction of rotation. See Bulletin O7B8141.

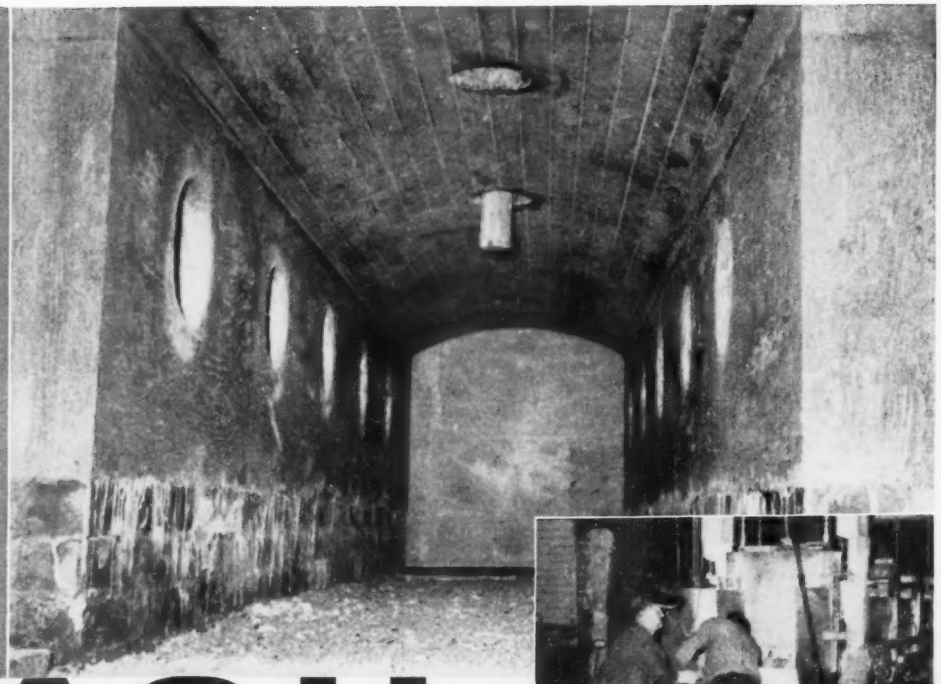
Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5409

weld-forging furnace arch and sidewalls CAST of . . .



TASIL HYDROCAST

. . . increases lining life— reduces rebuild labor costs!

Top photo: Arch and sidewall construction of weld-forging furnace, cast of TASIL HYDROCAST, before hearth rebuild. Note clean, joint-free appearance of Hydrocast.

Lower photo: This furnace in operation.

A mid-west manufacturer of hardened steel parts operates side-fired, weld-forging furnaces at 2350° F. These were formerly constructed of fireclay brick and shapes with 2000° F. insulating brick backup. Service life of the firebrick was 12-15 months—due to considerable attack on the lining by borax flux used in the welding process.

The arch and sidewalls of these furnaces are now *cast in one piece* with TASIL Hydrocast. Rebuild time was cut from 2 to 3 *days* normally required for the firebrick construction, to 3½ *hours* pouring time for Hydrocast. Furnace life *increased* to 24 months.

Fast, easy replacement, coupled with excellent durability, makes TASIL Hydrocast highly economical as a replacement for firebrick construction in many types of furnaces. Let the Taylor field engineer in your area give you full details.

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
REG. U. S. PAT. OFF.
REFRACTORIES SINCE 1864 • CINCINNATI • OHIO • U. S. A.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Hamilton and Montreal

FOR QUALITY THAT STANDS CLOSE INSPECTION

Pyle's mechanized foundry operation is devoted exclusively to pattern production. Capable of aluminum or magnesium castings, it assures uninterrupted flow of work to machines — keeps entire operation under one roof.

. . . we suggest you look to Pyle! Our business has been built serving customers who accept nothing less than perfection.

Here every wooden model is prepared in flawless detail by men averaging 19 years of patternmaking experience. Our integrated foundry is designed, equipped and operated exclusively for pattern production. We have the lathes, radial drills, milling machines, planers and hydraulic or automatic duplicators to meet your every need. Meticulous hand finishing and uncompromising inspection guarantee your complete satisfaction.

For fifty years we've made patterns for America's most quality-conscious firms. May we have the pleasure of making them for you?

PYLE

PATTERN AND MANUFACTURING COMPANY

Muskegon Heights, Michigan

K BOND† snagging wheels bring you...

5 Big advantages on 3 different metal types

Toughest workouts on gray iron, malleable iron and non-ferrous metals get money-saving "Touch of Gold" benefits

Norton CRYSTOLON abrasive, plus the K Bond — most radically improved vitrified bond for heavy duty, slow speed snagging of gray iron, malleable iron and non-ferrous metals — make a revolutionary snagging wheel combination. With it you're sure to benefit by:

1. Faster, freer cutting action
2. Much longer wheel life
3. Less frequent dressing
4. Corners held better
5. Consistent duplication

These advantages have been proved in many foundries, with reports like these from all over the country:

- *"K Bond wheels increased wheel life from 80 to 120 hours. Also reduced operator fatigue."*
- *"Best and fastest wheels ever used."*
- *"Cuts faster than competing wheel — longer life due to fewer dressings."*
- *"Better cut, better life — are adopting as standard for cast iron boiler parts."*
- *"K Bond wheels lasting 20% longer — best in our experience."*

Get This Proof

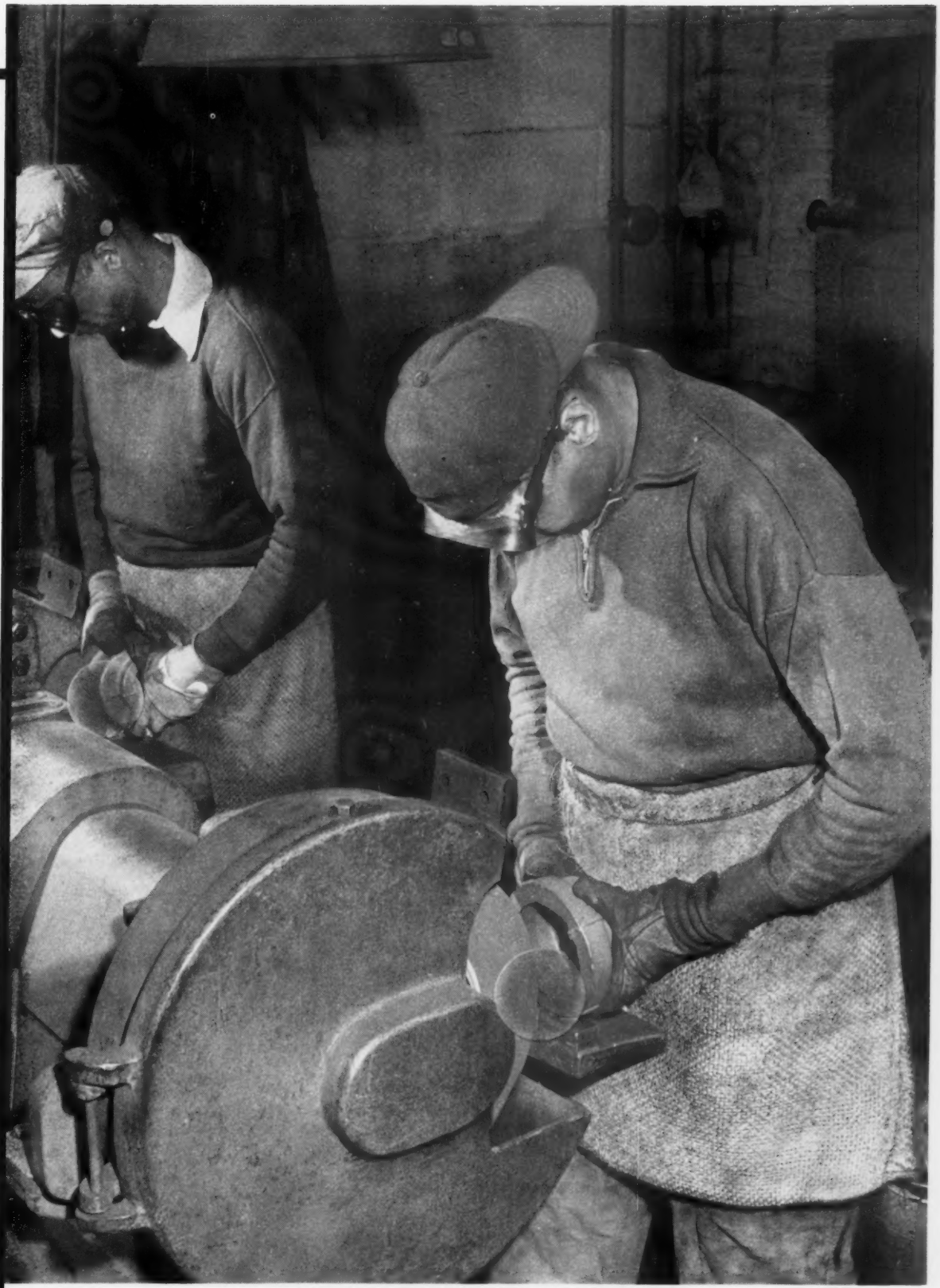
Learn how K Bond CRYSTOLON wheels will snag off more metal per dollar — on your heaviest jobs and machines. Your Norton Distributor will gladly arrange test runs in your plant. See him soon. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

NORTON
ABRASIVES
Making better products... to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels • Grinding Machines
Refractories
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Behr-cat Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries
†Patent applied for

W-1825



On a Floor Stand Like This you'll find Norton K Bond CRYSTOLON* wheels add the profit-boosting "Touch of Gold" to even the heaviest duty jobs. That holds good for every other type of rough grinding equipment, down to your smallest portables.

small addition
gives
BIG RESULTS!

This free brochure tells the whole story of Vancoram V-5 Foundry Alloy. Send for it today—and if you have any problems relating to other ferro alloys, call your nearest Vanadium Corporation Office.

VANCORAM V-5 FOUNDRY ALLOY

(a chromium alloy balanced with manganese and silicon)

- Makes improvement of gray iron easy and economical
- Small additions improve mechanical properties, density and uniformity
- Reduces chill, without formation of open structure in heavier sections
- Eliminates chilled corners and edges
- Improves machinability — lowers machining costs

Vancoram V-5 Foundry Alloy and other alloys for the iron foundry are also available through the following distributors:

Steel Sales Corporation
J. M. Tull Metal & Supply Co., Inc.
Whitehead Metal Products Company, Inc.
Williams & Company, Inc.

VANCORAM

VANADIUM CORPORATION OF AMERICA

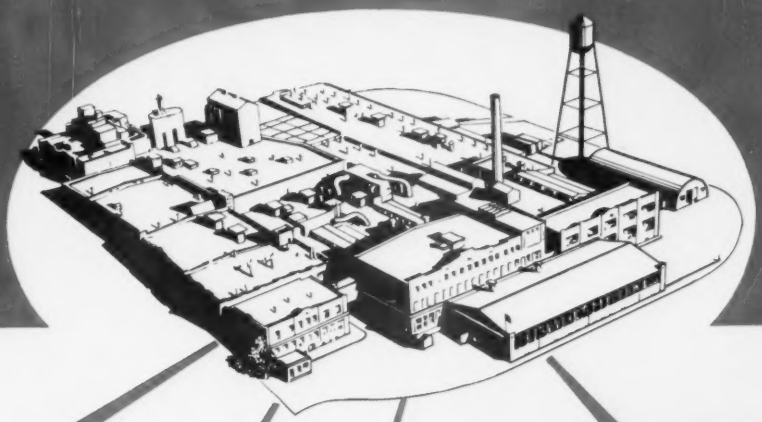
420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

Producers of alloys, metals and chemicals

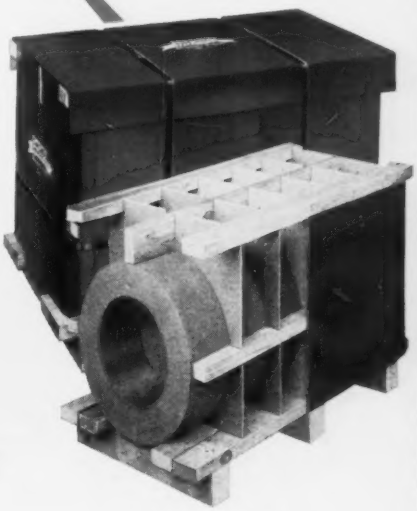
Circle 603 on Inquiry Card—Page 51

Circle 604 on Inquiry Card→

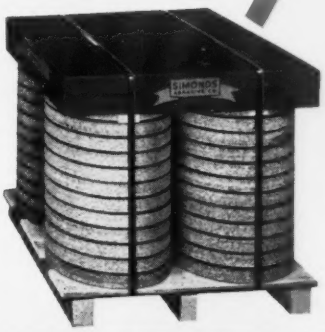
Now Simonds Grinding Wheels SHIPPED ON PALLETS for *Greater Savings*



EASIER ACCESS



SPACE SAVING



EASY HANDLING

NO MESSY UNCRATING

Specially engineered to save your stockroom space and reduce handling! That's the cost-saving idea of these new packages for Simonds Grinding Wheels.
No crates to pry open. No sawdust to unpack! The grinding wheels are racked or stacked on pallets . . .
held secure by steel straps . . . and protected by corrugated wrappers and dividers. Easily handled by fork-lift or hand-pallet truck. Another reason why it pays to specify Simonds Grinding Wheels.

SIMONDS ABRASIVE CO.

GRINDING WHEELS

SIMONDS ABRASIVE COMPANY

Tacony & Fraley Sts., Philadelphia 37, Pa.

DIVISION OF SIMONDS SAW AND STEEL CO.

BRANCHES: PHILADELPHIA • CHICAGO • DETROIT • LOS ANGELES • SAN FRANCISCO • PORTLAND, ORE.

For Call your **P**roven products **D**ependable know-how **Q**uick supply *Service*
SIMONDS DISTRIBUTOR

'DEPENDABLE'

SHELL CORE MACHINE

LOW Initial Cost . . .
ECONOMICAL Production . . .
EASE of Operation . . .

***Brings shell core molding within reach of* every foundry.**

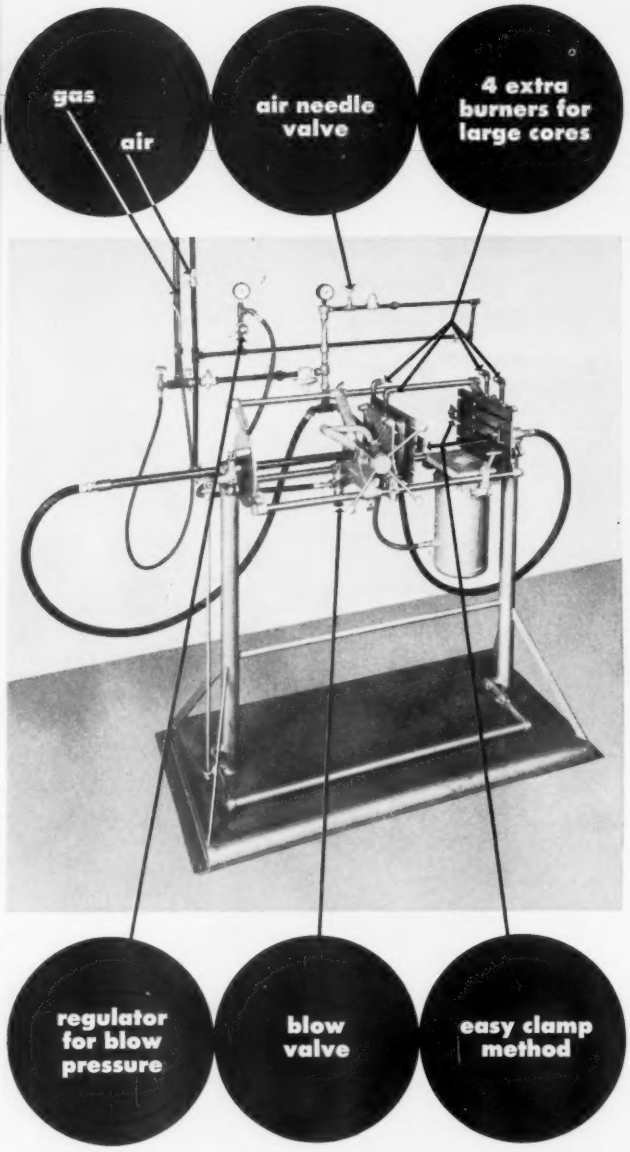
Engineered with foundry "know how" — the DEPENDABLE Shell Core Machine produces shell cores known for: Unexcelled Permeability . . . Collapsibility . . . Accuracy . . . Easy Shake-Out . . . and are used, not only in shell molds, but also in the regular greensand foundry and in permanent molds.

DEPENDABLE is a rugged, precision machine — engineered to give years of trouble-free service. All working parts are high grade castings, accurately machined. Ball bearing rollers make for easy carriage operation. Bronze hex-head bushings permit accurate core box matching.

1. "Quick Change" for short runs.
2. Core boxes can be used with little or no alteration.
3. Produces intricate small cores in four gang boxes at the rate of ten per minute, and cores up to 9" diameters or 18" lengths at the rate of one per minute.
4. Low Fuel Cost—Either natural, manufactured or bottled gas can be used with heat applied directly to the core box.
5. Various thicknesses of core can be obtained by length of time invested.
6. Eliminates the need for driers or pasting.

Price **$994.00,** F. O. B. Portland, Oregon
Shipping Weight, crated, 400 lbs.
Completely equipped with all valves and controls.
Easily installed.

DEPENDABLE
PATTERN WORKS
1634 S.E. SEVENTH AVENUE
PORTLAND 14, OREGON



DEALERS:

Frederic B. Stevens
Detroit 16, Michigan

Pennsylvania Foundry Supply and Sand Co.
Philadelphia 24, Penna.

M. A. Bell Co.
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Kramer Ind. Supply, Inc.
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Denver 5, Colo.

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Los Angeles 58, Calif.

Harold E. Pridmore
Palo Alto, Calif.

LaGrande Ind. Supply
Portland 1, Oregon

Michigan Model 12B handles 500 tons of sand per day . . .

Foundry management reports

"Output doubled, downtime down 90%"

Superior Steel & Malleable Castings Company, Benton Harbor, Michigan, originally purchased their 16 cubic foot Model 12B to help another loader of the same rated capacity. But the Michigan moved almost twice as much tonnage as the other machine—approximately 500 tons of sand per day. So it alone now handles nearly all bulk material; the other machine used only at times of peak demand.

More power to dig

This added output has been no surprise to Superior Company officials. Neither has a 90% reduction in downtime. With a 20% margin of weight and power over other machines in its size class, the Michigan digs its way into tough material where other machines just spin their wheels. Low-level bucket action enables the Michigan operator to carry loads low, with good visibility and safe center of gravity. Clark's exclusive power-shift transmission makes all shifts quickly—high, low, forward, reverse—saves vital seconds on every cycle.

Maneuverable in tight quarters

Despite its extra weight and power, the Michigan Model 12B is completely competitive in terms of dimensions and maneuverability. It operates neatly and efficiently in boxcars, narrow aisles, storage bins. In fact, it is easier to operate in tight quarters like these because the operator does not have to clutch and declutch between Forward-Reverse. He shifts merely by flicking a small steering post power-shift lever . . . doesn't clutch or even have to take his left hand off the steering wheel! Torque converter, planetary wheel drive axle take up all shocks.

Write for demonstration

Until you've seen this Michigan Model 12B *in your plant,* don't buy any bulk-handling equipment. No other machine can match the Model 12B's combination of features or amount of work produced. Clip coupon to your letterhead to arrange to see it.

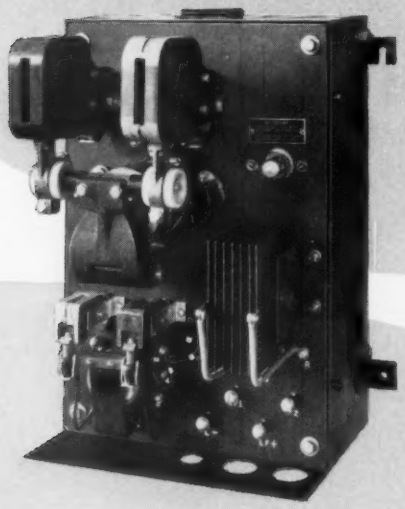
Michigan is a registered trade-mark of

CLARK® EQUIPMENT

Arrange demonstration of Model 12B:

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Road
Benton Harbor 3, Michigan

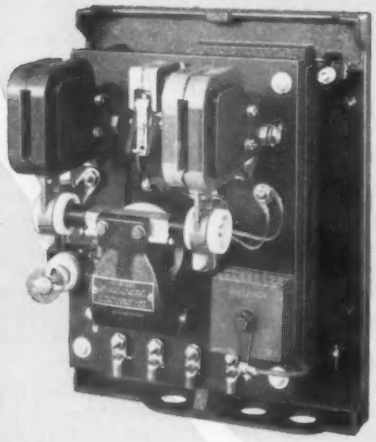
Ohio RD2 Controller (case not shown)



for better performance
it's Ohio Magnets—
especially when used with

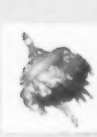
OHIO MAGNET CONTROLLERS

Ohio RD1 Controller (case not shown)



Size for size, Ohio Magnets lift larger loads over longer periods—*particularly when used with Ohio Magnet Controllers.* For Ohio Magnet Controllers are of the high-efficiency, instantaneous-discharge type for any standard or special line voltage from 36 to 250 volts DC. Specify Ohio RD1 Controllers for 35-100 amps, Ohio RD2 Controllers for 75-150 amps—and get better magnet performance. Check Yellow Pages for your nearest Ohio Electric representative or contact Ohio plant for full information.

AA-3988



ohio ELECTRIC

Chester Bland
President

THE OHIO ELECTRIC MFG. CO.

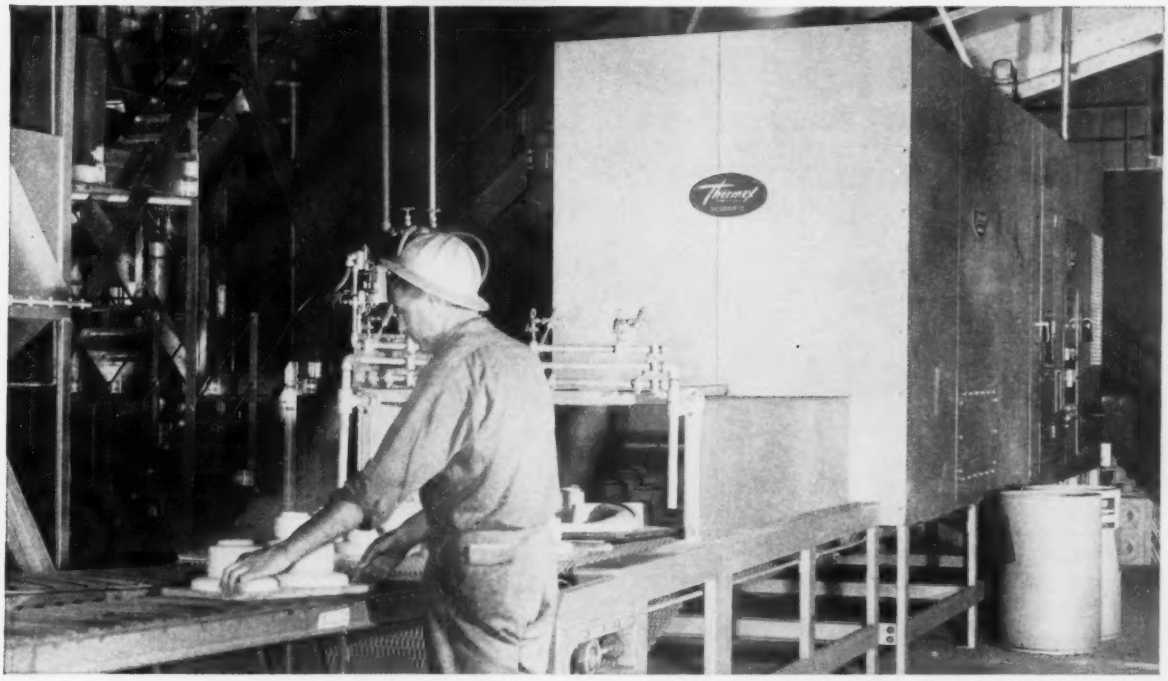
5400 Dunham Road • Maple Heights • Cleveland, Ohio

Ohio Also Makes Separation Magnets
Nail Making Machines • Fractional
Horsepower, Shell and Torque Motors

"Cores are better... costs are less"

Says Charlotte Pipe & Foundry Co.

J. B. Williams, Operator, and J. W. Price, Foreman, examine one of uniformly-baked hub cores.



Hub cores come from automatic core blower to input end of THERMEX *Core Baker, shown above.*

● The modern new facilities of Charlotte Pipe & Foundry for centrifugal casting of soil pipe include the THERMEX* 75KW Dielectric Core Baker shown above. It is part of an automated line, rated at 3500 lbs. per hour, for production of hub cores.

James W. Price, Foreman, says: "The THERMEX Core Baker gives us uniform cores with good surface hardness. Scrap loss due to breakage is very low. Quality is better and costs are less than for similar cores produced by other methods."

A THERMEX Engineer will gladly give you facts on how *you* can profit with this leading dielectric core baking equipment. Call our nearest office.

*THERMEX–T.M. Reg. U.S. Pat. Off.

Thermex® DIELECTRIC CORE BAKER

THERMEX DIVISION

Sales Offices: 76 Beaver St., New York 5, N. Y.
133 So. Clinton Avenue, Rochester 4, N. Y.
505 Delaware Ave., Buffalo 2, N. Y.
239 Newton Avenue, Newark, Ohio
624 So. Michigan Avenue, Chicago 23, Ill.
714 West Olympic Blvd., Los Angeles, Calif.

the **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

LOUISVILLE 1, KENTUCKY

Circle 608 on Inquiry Card—Page 51

The perfect pair for radiographic problems

Ansco Industrial X-ray Films
Ansco Processing Chemicals

No wonder great industries depend on this great team for radiographic inspection. Used together, they can help build and maintain a reputation for quality.

Ansco Industrial X-ray films are tailored especially for industry. They provide proof of soundness even in the thickest metal parts or weldments. Superay "A" ideal for most radiographic inspection. Use Superay "B" to get maximum definition and choose Superay "C" whenever maximum speed is required.

Ansco processing chemicals are the *right* chemicals for perfect processing results. Like Ansco films these chemicals are backed by over a century of skill, by exhaustive technical research, by experience on a broad variety of accounts (serviced always on a personal basis). *Let Ansco watch over your quality.*

Ansco **America's Oldest Maker of Photographic Materials**
Binghamton, New York • A Division of General Aniline & Film Corp.

Circle 609 on Inquiry Card—Page 51

Circle 610 on Inquiry Card→

After only 90 seconds of vi-

AT YOUR SERVICE

The strategic location of our manufacturing facilities, sales offices and warehouses, assures efficient handling of your ferro-alloy needs.

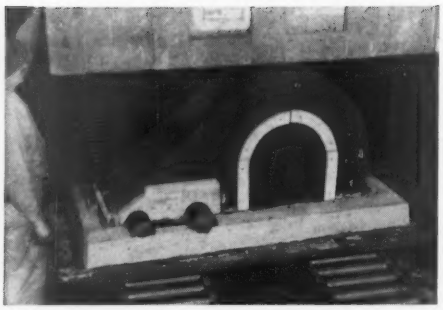
PLANTS: Philo, Ohio; Brilliant, Ohio and Tacoma, Washington. SALES OFFICES: Birmingham, Chicago, Detroit, Los Angeles, Philadelphia, Pittsburgh, San Francisco, Seattle. WAREHOUSES: Denver, Los Angeles, Minneapolis, Oakland, Salt Lake City, Mexico City and Vancouver, B. C., Canada. *We invite your inquiry.*

Ohio Ferro-Alloys Corporation
Canton, Ohio

Save

Many refractories

After only 90 seconds of vibrating, 2500 pounds of core "come clean".



CP Core Box Vibrator frees 3000 pound cores in 90 seconds!

In just a minute-and-a-half this Core Box Vibrator frees cores weighing up to a ton-and-a-half! Core output is greatly increased and you get a perfect draw every time. Cores come out with no flaws, damaged edges, distorted sections or dimensional variations . . . there's no time wasted troweling. Needs no special adaptors . . . the built-in air clamp holds the vibrator securely to any core box cleat up to 6¼" wide. Its 9000 orbital vibrations per minute eliminate sledging . . . reduce core box maintenance to a minimum. In spite of the core size, the CP vibrator is positioned only once. Write for free demonstration on your work.

Chicago Pneumatic Tool Company,
8 East 44th St., New York 17, N. Y.

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Circle 611 on Inquiry Card—Page 51

Circle 612 on Inquiry Card→

Save by using specialized refractories

Many refractories problems in metal-working furnaces have been solved *economically* by the use of B&W specialized refractory castables. Each ferrous or non-ferrous furnace application requires a specific combination of properties to meet the service conditions. Whether your problem is high temperatures, abrasion and erosion, slag attack or the need for insulation, to name a few, you will find the refractory castable best suited to your requirements in B&W's line. Shown here in digest form are data on the widely used B&W refractory castables for metal-working furnaces:

B&W Refractory Castables for Metal Working Furnaces

	Temp. F	PROPERTIES	TYPICAL APPLICATIONS
B&W Kaocast	3000	**High resistance to spalling and slag attack. Low volume change and negligible reheat shrinkage.**	**Soaking pit covers, linings of high temperature heating and forging furnaces, burner blocks, electrode linings of electric furnace roofs, linings of non-ferrous metal furnaces.**
B&W Kaocrete 32	3200	High strength, exceptional refractoriness, unusual volume stability, excellent resistance to spalling.	Can be used in applications similar to those of B&W Kaocast and where higher refractoriness is required.
B&W Kaocrete D	2500	**Sufficient strength and hardness to withstand abrasion, considerable physical abuse and erosion.**	**Aluminum melting furnaces, linings and car tops in heat treating furnaces, as well as in sections of a wide variety of furnaces that are subject to scraping by hand tools or other mechanical abuse.**
B&W Kaocrete A	2600	Resists reducing atmospheres. Has good resistance to erosion, abrasion and thermal shock.	Annealing furnace bases and other applications where resistance to reducing atmospheres is essential. Also as a general purpose castable for linings in medium temperature service.
B&W Kaocrete B	2300	**Has an adhesive plastic texture particularly suited for vertical or overhanging constructions. Excellent for plastering.**	**Patching linings and baffles and for any application where plastering rather than gunning or casting is required.**
B&W Kaocrete LI	2700	High alumina content, exceptionally high strength for resistance to abrasion and erosion.	Aluminum furnace linings where high alumina content is important.
B&W Kaolite 20	2000	**Offers castable's fast, low cost installation plus insulation. Has refractoriness, light weight and low heat conductivity and, in addition, will resist reducing atmospheres. Can be poured or gunned.**	**Aluminum melting, heating and heat-treating, annealing and forge furnaces. Also for general maintenance and patching.**
B&W Kaolite 22	2200	**Has the same properties as B&W Kaolite 20. Can be used for higher temperatures but not in reducing atmospheres.**	

Send for your copy of B&W Bulletin R-35. It gives additional information on B&W's versatile refractory castables.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

RS-1

Look for these features When you Buy Your next Face Shield

- Quick Window Interchange
- Lightweight Comfort
- Deeper Spark Deflector
- Extended Window for Nose Clearance and Additional Ventilation
- Selected Vulcanized Fibre

AO "H" Series Face Shields

H-1 For protection when sawing metal and similar operations. Strong, cool, comfortable. Adjustable elastic headband may be worn low for extra comfort. Easily replaceable genuine leather sweatband snap-on type, clear or green window. 3 window sizes, 3 thicknesses . . . 020" thick window aluminum bound, others bound at slight extra cost. Furnished standard with 8" x 11½" x .040 window unbound.

H-2 — Quality protection when working with chemicals, sawing metals, sanding, grinding. Headgear has same construction, comfort and durability as the H-1 except for large spark deflector. Standard with genuine leather sweatband.

H-3 — Very popular. Identical to H-2 except back headband is fibre, adjustable. Long band slides within a fibre sleeve, permitting easy adjustment to head size and preventing hair pulling. Adjustment by knurled nut. Standard genuine leather sweatband.

H-4 — Similar to H-3 except fitted with *full* spark deflector. Ideal for work in tight places where head lacerations are a hazard. Deflector protects forehead and frontal scalp from flying chips.

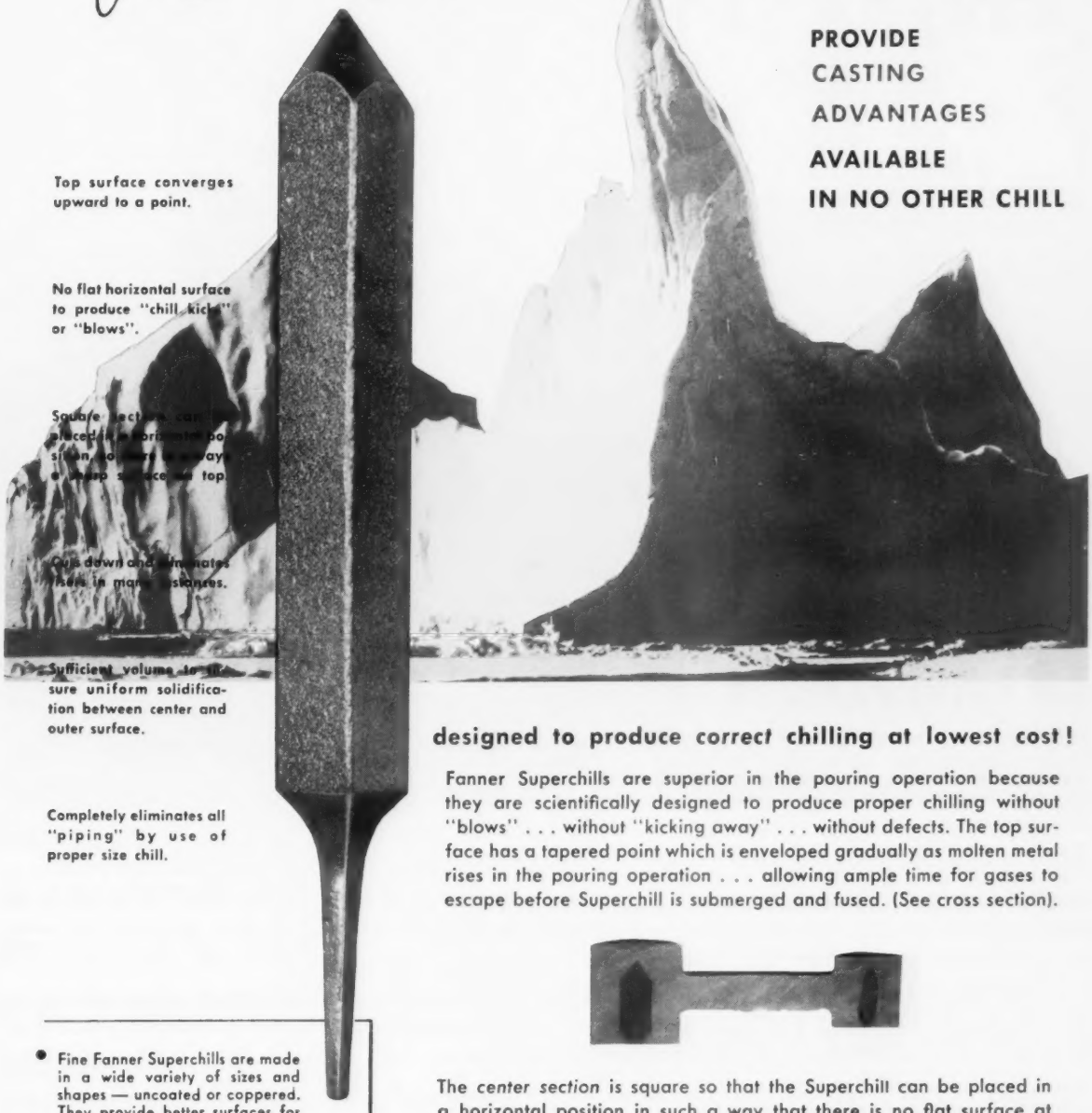
H-5 — Newest of the line. Recommended for jobs involving babbitting, chemical exposure and operations on high octane gasoline. It's splash proof! Any H-5 window can be attached quickly and easily by (1) Sliding back two end clips (2) Turning top of three centre studs to vertical (3) Sliding end clips forward over back edge of window.

Your nearest AO Safety Products Representative can supply you. Always insist on Trademarked Safety Products.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

when it comes to CHILLING... there's no CHILL like fine FANNER SUPERCHILLS


Top surface converges upward to a point.
No flat horizontal surface to produce "chill kick" or "blows".
Sufficient volume to insure uniform solidification between center and outer surface.
Completely eliminates all "piping" by use of proper size chill.

PROVIDE CASTING ADVANTAGES AVAILABLE IN NO OTHER CHILL

designed to produce *correct* chilling at lowest cost!

Fanner Superchills are superior in the pouring operation because they are scientifically designed to produce proper chilling without "blows" . . . without "kicking away" . . . without defects. The top surface has a tapered point which is enveloped gradually as molten metal rises in the pouring operation . . . allowing ample time for gases to escape before Superchill is submerged and fused. (See cross section).

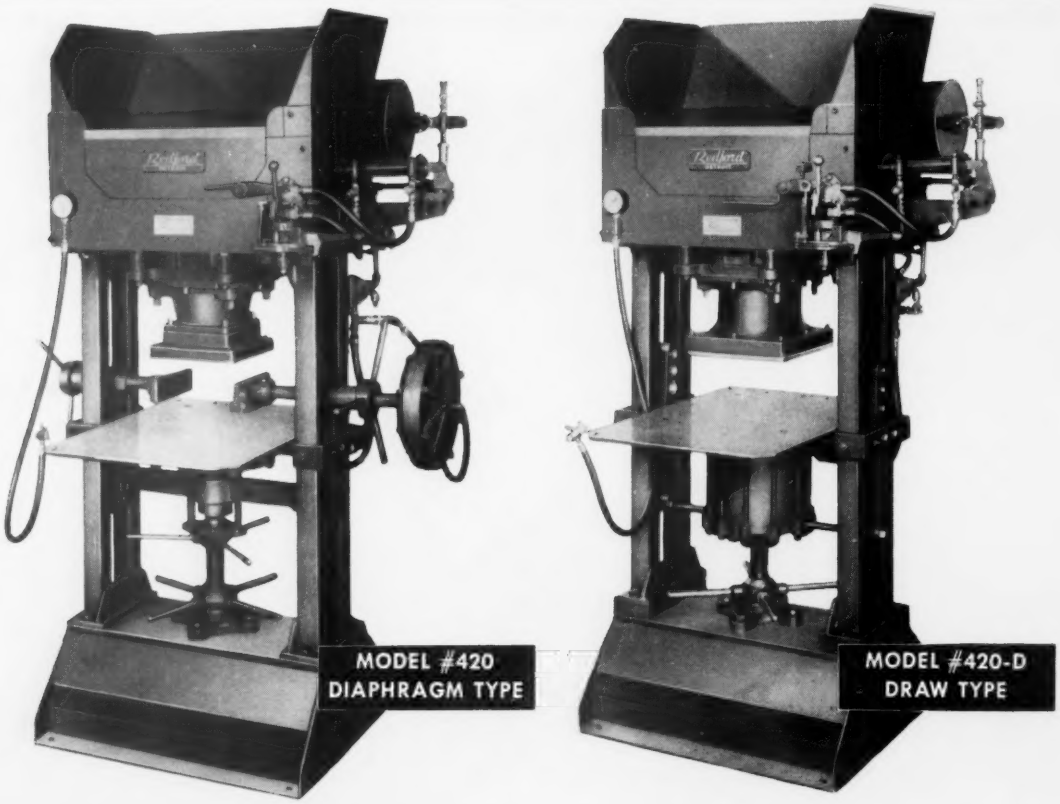
The *center section* is square so that the Superchill can be placed in a horizontal position in such a way that there is no flat surface at the top but a corner at all times. Square headed tacks in the core box or on the pattern are used to indicate position. Frequently, when a round chill is used, fusion is not complete, and when drilled, the chill turns with consequent breakage. The square Superchill cannot turn . . . and its corners aid in fusion. If you do not have complete information on these exceptional Superchills, write for details today.

- Fine Fanner Superchills are made in a wide variety of sizes and shapes — uncoated or coppered. They provide better surfaces for molten metal to join with and more chilling volume per pound. They have universal use throughout industry.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK **CLEVELAND 9, OHIO**



Redford CORE BLOWER AND CORE SHOOTER

Here is a core making machine that is setting new standards in versatility and performance. The #420 Redford is equipped *to make cores up to 20 lbs. using any type binder.* Proven core blowing practices may be continued to do the most intricate work and to assure maximum production. Tough sand mixes which do not readily lend themselves to blowing can be used in ramming or shooting cores.

Core shooting requires a fast acting machine having sufficient capacity to propel sand at high velocity through a large shoot head opening. The large shoot head opening offers little resistance to the flow of sand and allows any sand to be rammed into suitable open cavity core boxes ahead of the propelling air.

With the #420 Redford we offer a tool that allows you the widest choice of application. It is a properly balanced combination of standard Redford practices that makes possible a low cost machine of greater usefulness and versatility to meet today's core room requirements.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

For Complete Information write for
BULLETIN #42

50 points of Moly = 7000 psi

Moly makes it easy to increase strength of cast iron. Made at the spout, or in the ladle, small Moly additions require no change in the character of the charge, normal melting practice, or the base metal.

More and more foundries find Moly the *practical* way to add strength and toughness to gray cast iron.

For Moly is easy and convenient to use. It allows continuous cupola operation, even when a special job calls for high-strength iron. It's one reason why, in 1956, the use of Moly greatly increased, even though cast iron sales generally declined.

If the use of Moly for high-strength iron isn't already standard practice in your shop, it will pay you to get the full story of how to upgrade iron, without changing normal practice. Write now for our series of bulletins "Why Moly Iron". Climax Molybdenum Co., Dept. 50 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM

Circle 616 on Inquiry Card—Page 51

SHELL MOLDERS:
Speed Shell Production with
DOW CORNING 8 EMULSION
(SILICONE PARTING AGENT)

You'll say it's "sheer magic" when you see the way Dow Corning 8 Emulsion helps increase production of dimensionally accurate sand-resin shells and shell cores.

The silicones in Dow Corning 8 are so remarkably heat resistant, they refuse to decompose at molding temperatures. With only a minimum of build-up, molds stay clean much longer . . . You spend more time **producing** good shells, less time cleaning patterns.

Let Dow Corning Silicones lend a hand in getting longer production runs from your patterns. Use Dow Corning 8 silicone emulsion for easy release, less build-up and lower costs.

8 reasons why . . .

LEADING SHELL MOLDERS PREFER DOW CORNING 8 EMULSION water-dilutable silicone parting agent . . .

• quick, easy release • easy to apply — faster wetting action • economical in extremely low concentrations • resists creaming or separation • minimum build-up — closer tolerance shells • stepped-up production — maximum number of shells between pattern cleanings • nonflammable • fast delivery from centrally located warehouses.

Generous Free Sample and new "how to do it" brochure on Shell Molding with Silicones are yours for the asking. Address Dept. 5921

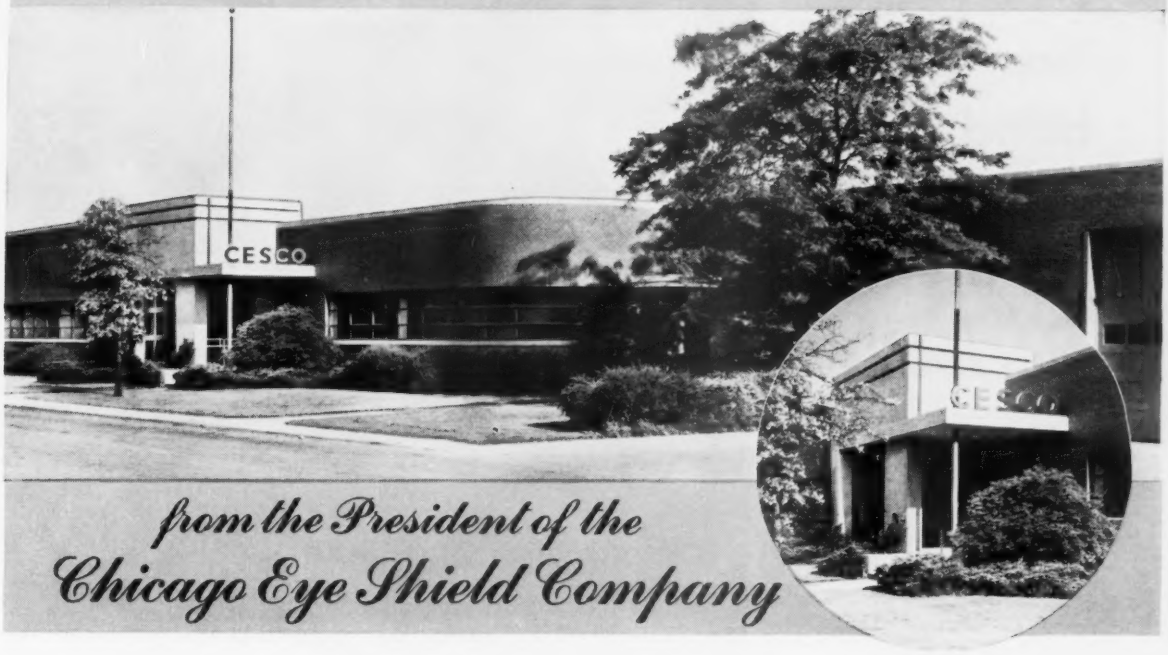
first in silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C.

an Important Message...



from the President of the Chicago Eye Shield Company

TO OUR HOST of customer friends and distributors, Chicago Eye Shield Company is pleased to announce a significant development in our progress. After doing business for over half a century at our Warren Avenue location, Chicago Eye Shield Company will move to new and larger quarters on Chicago's northwest side.

A company can embark on an expansion program of this scope only if its present and future volume of business so warrants. Such is the case with Chicago Eye Shield Company. It is for this reason that we want to share this important occasion with the people who have made it possible—our customers, our distributors, and of course, our employees.

We look to the future with renewed enthusiasm, knowing we will be able to do a better job of manufacturing CESCO products due to the improved production facilities our new plant offers.

For example, our new quarters offer over 50% more productive area and have been so layed out as to yield an increased flow of finished products through simplified material handling. In addition, we will have larger laboratory facilities to aid us in making technological product improvements so essential to maintaining CESCO's high standard of quality.

All of these changes, and many others, have been planned with but one purpose in mind... *to offer better products and better service to our customers.* I am certain you will feel the impact of these improvements in the very near future and I am sure you will be pleased with the results.

Again, a sincere thanks to all who have helped us to take this significant forward step.

Robert Malcom, Jr.
PRESIDENT

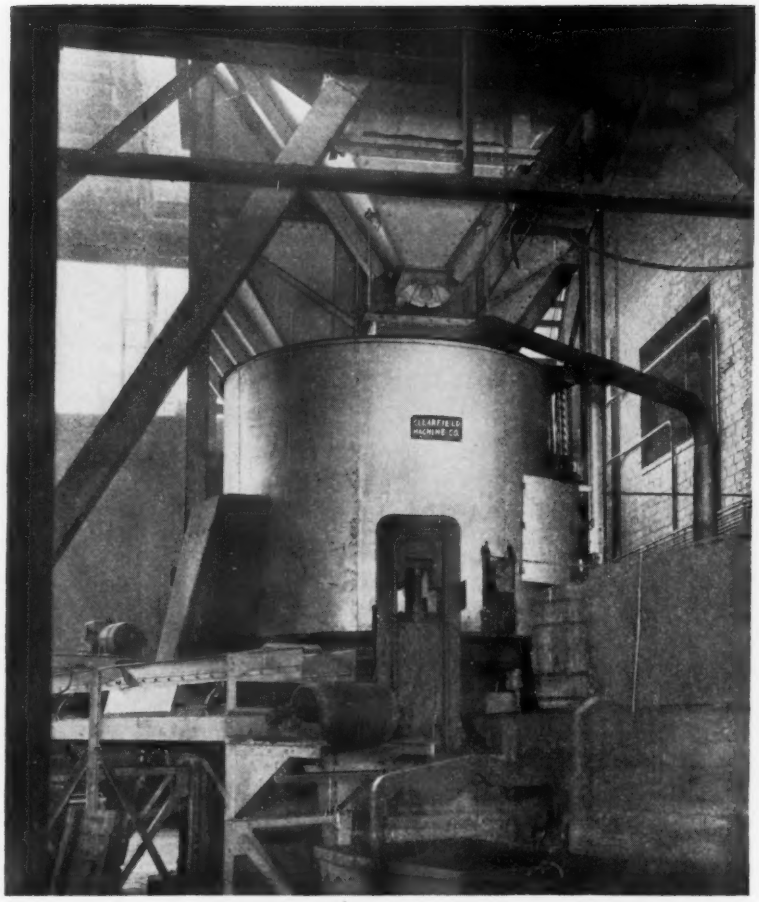
CESCO CESCO **FOR SAFETY**

OUR NEW ADDRESS:
2727 WEST ROSCOE, CHICAGO 18, ILLINOIS

Circle 618 on Inquiry Card—Page 51

LITHIUM PRODUCT DATA

silica grains, bond and moisture are *Perfectly Blended* with a



CLEARFIELD MIXER

Sand quality depends on how well three elements are blended. Silica grains, bond and moisture make up the major part in preparing quality sand. The performance of Clearfield Mixers is based on preparing better foundry sand.

Employing the revolving pan principle with vertically rotating mullers, Clearfield Mixers transform the sand from an inert mass into a fluid moving stream by the stirring action of the agitator and centrifugal force. This results in a perfect blending of the three elements . . . thereby producing a better foundry sand.

Write today for Catalog No. 83. See why there is a Clearfield Mixer for every requirement.

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A

Circle 619 on Inquiry Card—Page 51

LITHIUM PRODUCT DATA

LITHIUM CORPORATION OF AMERICA, INC.

2600 RAND TOWER MINNEAPOLIS 2, MINNESOTA

PRODUCT	PROPERTIES	USES
Lithium Metal Li Purity: Typical Lithium content: 99.8% Also Available: **Lithium Metal** (Low Sodium Content) 0.005% Na Max.	Atomic Weight: 6.940. Density: 0.53 gm/cm^3. Melting Point: 180.5°C, 365.0°F. Boiling Point: 1317°C, 2403°F. Hardness, Mohs' Scale: 0.6. Heat of Fusion: 103 cal/gm. Heat of Vaporization: 4680 cal/gm. Heat Capacity: 0.85 cal/gm/°C at 25°C.	Metallurgy: Deoxidizer, desulfurizer and degasifier in metal melts. Self-fluxing brazing alloys. Hardening agent in bearing metal alloys. Organic Chemistry: Lithium alkyls and aryls in organic synthesis. Reducing agent. Chemical Manufacturing: Starting material in production of lithium hydride and lithium amide. Nucleonics: Fusion reactions. Heat transfer. Analytical Chemistry: Removal of nitrogen from inert gases. Pharmaceutical: Synthesis of Vitamin A.
Lithium Metal Dispersions	Dispersing Media: Dodecane, diisopropylbenzene, mineral oil, petrolatum, paraffin wax. Particle Size: Over 90% under 25 microns.	Catalysis: Used to catalyze the polymerization of isoprene to a synthetic rubber closely resembling natural rubber. Organic Chemistry: Lithium alkyls and aryls in organic synthesis.
Lithium Metal Cartridges	Form: Lithium metal hermetically-sealed in copper tubing: 2.25, 4.50 & 9.0 gram charge. Hermetically-sealed in copper cup: 108.0 gram charge. Hermetically-sealed in aluminum tubing: 2.25, 4.50 & 9.0 gram charge.	General purifying agent in metal melts.
Lithium Chloride LiCl Grade: Technical Anhydrous salt and brine.	Molecular Weight: 42.40. Color & Form: White, hygroscopic, granular powder. Density: 2.068 gm/cm^3 at 25°C. Melting Point: 608°C. Boiling Point: 1382°C. Specific Heat: 0.288 cal./gm./°C. at 25°C. Heat of Formation: 97.70 kilocal./gm. mol. at 25°C. Heat of Solution: 8.49 kilocal./gm. mol. (200 mols. H_2O/mol. LiCl). Solubility: Moderately soluble in organic solvents such as alcohols, aldehydes, ketones, esters, pyridine, ethylenediamine, etc.	Air conditioning: Used as a brine in dehumidification systems. Metallurgy: Flux component for brazing aluminum, magnesium, zirconium, titanium and their alloys. Electrolytic preparation of lithium and other metals. Heat treating. Dry Cells: Additive to the electrolyte of dry cells for low temperature use. Organic reactions: Catalyst. Drying Agent. Prevention of frost formation. Fire Extinguishers: As a non-freezing brine. Atomic Energy: Removal of fission products.
Lithium Fluoride LiF Grade: Technical Anhydrous	Molecular Weight: 25.94. Color & Form: Fine, white powder. Density: 2.640 gm/cm^3 at 25°C. Melting Point: 848°C. Boiling Point: 1681°C. Solubility: Slightly soluble in water; insoluble in alcohol.	Metallurgy: Component in welding and soldering fluxes. Ceramics. Optics: Synthetic crystals in infra-red and ultra-violet instruments.

member of...

AMERICAN LITHIUM INSTITUTE, INC.

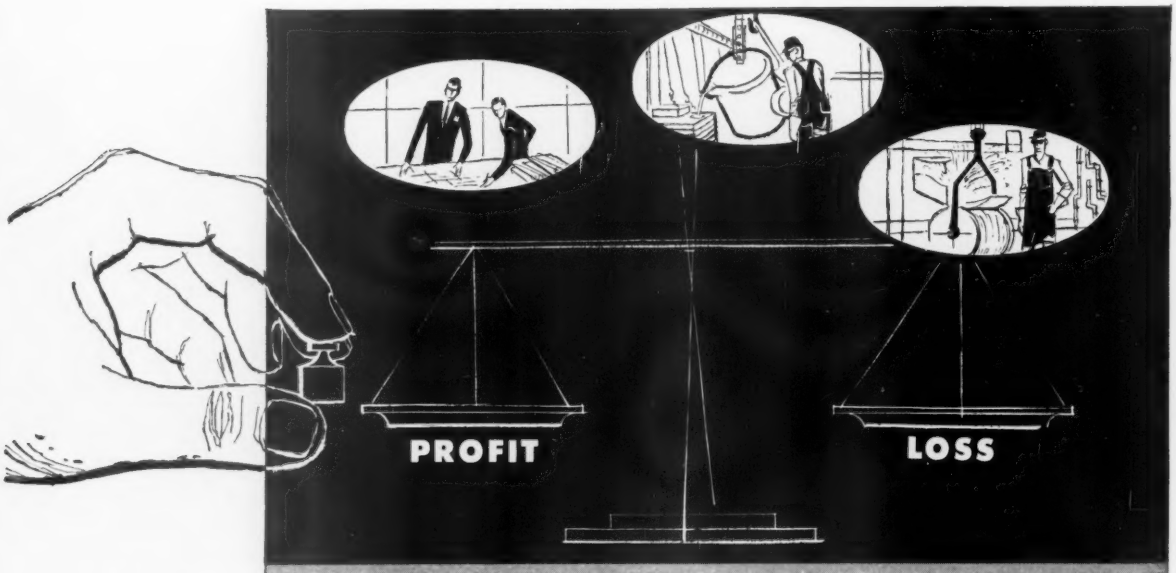
WRITE FOR PRODUCT DATA SHEETS

... trends ahead in industrial applications for lithium

PROCESSORS OF LITHIUM METAL • METAL DISPERSIONS
METAL DERIVATIVES: Amide • Hydride
SALTS: Bromide • Carbonate • Chloride • Hydroxide • Nitrate
SPECIAL COMPOUNDS: Aluminate • Borate • Borosilicate • Cobaltite • Manganite
Molybdate • Silicate • Titanate • Zirconate • Zirconium Silicate

BRANCH SALES OFFICES: New York • Chicago • Bessemer City, N. C.
MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, N. C.
Cat Lake, Manitoba • Amos Area, Quebec
PLANTS: St. Louis Park, Minnesota • Bessemer City, N. C.
RESEARCH LABORATORY: St. Louis Park, Minnesota

Circle 620 on Inquiry Card—Page 51



Knight services include:

- Foundry Engineering
- Management
- Organization
- Industrial Engineering
- Wage Incentives
- Cost Control
- Production Control
- Modernization
- Mechanization
- Materials Handling
- Automation
- Survey of Facilities
- Architectural Engineering
- Construction Management

The sound way to REALIZE ANTICIPATED PROFITS is to AUDIT your operations

In foundry operation, making the best use of facilities and manpower determines the balance between profit and loss.

In many foundries, management and operation audits by experienced Knight engineers have helped to swing the balance to profit—through low-cost, readily effected improvements.

A recent Knight audit for a Michigan foundry resulted in substantial production increases and reduced costs. Improvements included the installation of a conveyor which eliminated handling . . . a rearrangement which increased capacity without additional floor space . . . and automatic timing devices which brought accurate process control and increased production.

These simple low-cost changes, accomplished without interruption to production, are part of a coordinated plan which is designed for future expansion requirements.

If you are interested in an audit of your operations to establish a program of improvement, take advantage of Knight experience and call or write our Chicago or New York office for prompt attention, without obligation.

Write for Bulletin 101 Professional Foundry Engineering.

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

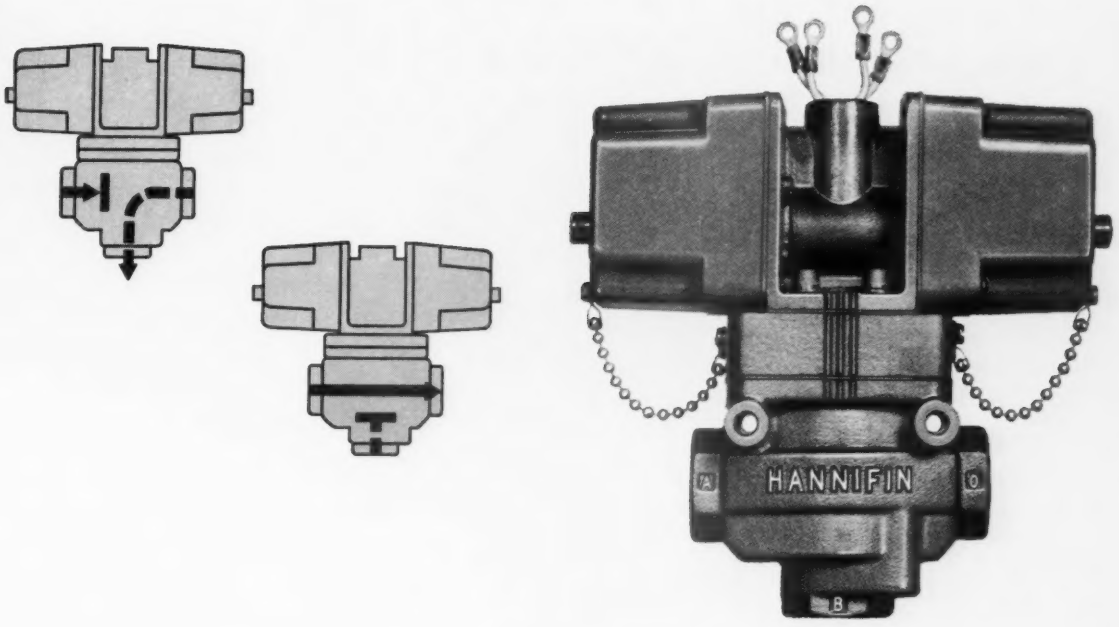
549 W. Randolph St., Chicago 6, Ill.

917 Fifteenth St., N.W., Washington, D.C.

New York Office—Lester B. Knight & Associates, 375 Fifth Ave., New York City 16

Setting the pace for automation

...Hannifin valves



Automatic processes call for speed, sensitivity and flexibility in directional air control. Above all, they demand dependability. That is why so many valve users find it pays to choose Hannifin.

Every feature that contributes to dependable performance has been incorporated in Hannifin air control valves. This dependability is the result of never-ending research and development.

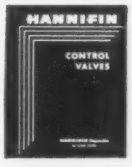
In the broad Hannifin line, you will find valves with new exclusive features... valves for practically any kind of automatic sequential operation. All are simple in design, with few and easily replaceable parts.

AIR CONTROL

HANNIFIN

VALVES

For this complete catalog showing all the Hannifin directional air control valves, write to Hannifin Corporation, 637 South Wolf Road, Des Plaines, Illinois.



Circle 622 on Inquiry Card—Page 51

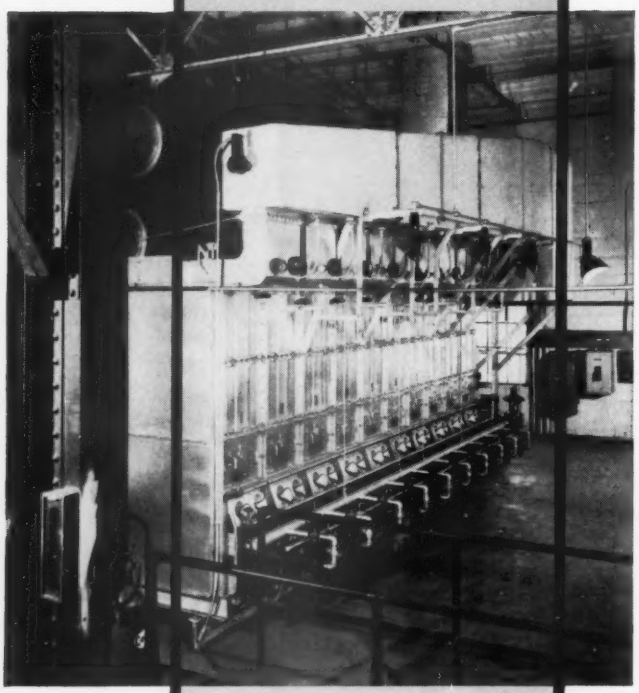
ROSS

Air Systems

Engineered Atmospheres for Better Processing

ROSS HOT BLAST SYSTEM

- *an efficient way to heat cupola air*
- *a simple way to get this hot air to the cupola*



How hot would you want the air going to the cupola? 500 degrees? 1000 degrees?

The ROSS Hot Blast System can deliver hot air in any volume required up to about 1000°F. It is designed with two major variations: (1) for heating the air up to 500°F. and (2) up to 1000°F. Either unit can be tied into your present operations without stopping production. Existing blowers, if correctly rated, can be used.

You know the production advantages in being able to deliver to the cupola air preheated to the correct temperature — and held at that temperature — in the required volume. We suggest you ask to have a Ross Engineer study your cupola layout and outline probable savings if you change over to the Ross System.

ROSS CORE OVENS

While the Hot Blast System makes use of air and there is definitely a conditioning and control problem involved, it is with the CORE OVEN that skill in designing and creating the 'engineered atmosphere' is the major factor. For Curing Ovens, to be most efficient, must coordinate temperature, air volume and air movement so as not only to provide uniform temperature conditions throughout the oven but to keep temperature drop to a minimum. Only uniformly baked cores can assure maximum production of castings. Wide temperature variations are bad.

THE ROSS GROUP OF COMPLEMENTING SERVICES

J. O. Ross Engineering Corporation, New York
Andrews and Goodrich Division, Boston
Ross Engineering of Canada Limited, Montreal
Ross Midwest Fulton Corporation, Dayton
Carrier-Ross Engineering Company, Ltd., England
John Waldron Corporation, New Brunswick, N. J.

J. O. ROSS ENGINEERING CORP.

444 Madison Avenue, New York 22, N. Y.

ATLANTA • BOSTON • CHICAGO
DETROIT • LOS ANGELES • SEATTLE

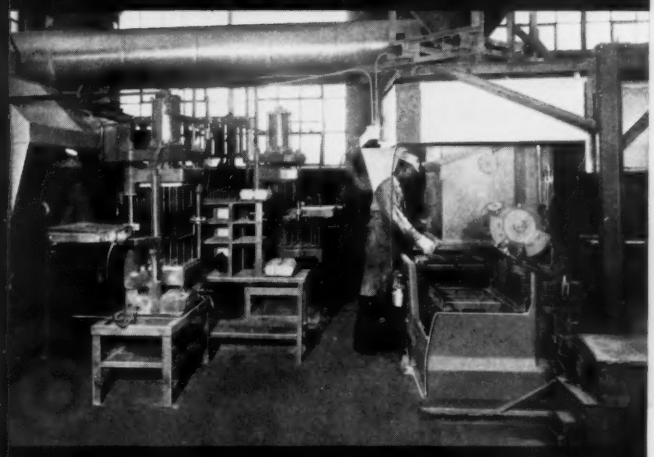
Circle 623 on Inquiry Card—Page 51

Circle 624 on Inquiry Card→

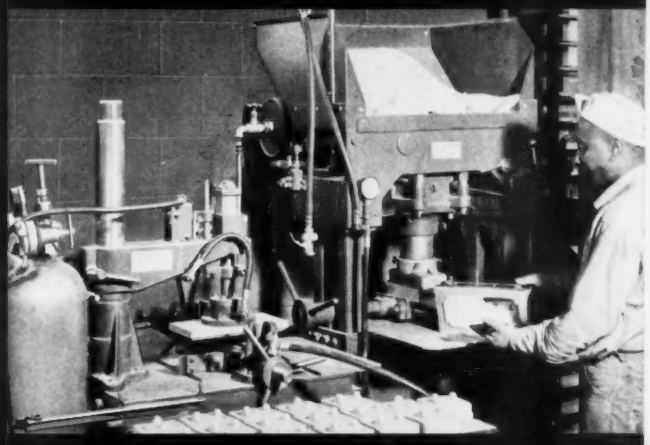
COMPLETE SHELL FACILITIES

at your service . . .

MOLDS—Newest production methods, latest equipment combine to produce high precision, low cost shells on quantity basis.



CORES—Automatic, economical CO_2 shell core-making facilities round out an efficient "mold-a-minute" precision production team.



CASTINGS—Close tolerance, smooth finish, non-ferrous shell-type castings are poured from metal melted in high frequency induction furnaces.

For fast service, fine dimensional accuracy and low over-all cost on small and medium size non-ferrous castings, look to City Pattern Foundry & Machine Company. Here you'll find, too, all the additional facilities . . . a complete, modern pattern shop, foundry, metallurgical laboratory and machine shop . . . that are required to provide an *all inclusive* service on top quality shell process castings.

City Pattern Foundry & Machine Company's experience in the shell process dates back ten years. As a result, here are shell facilities you can count on for all your jobbing needs. We'll be delighted to discuss your needs with you in detail. Why not call or write today.

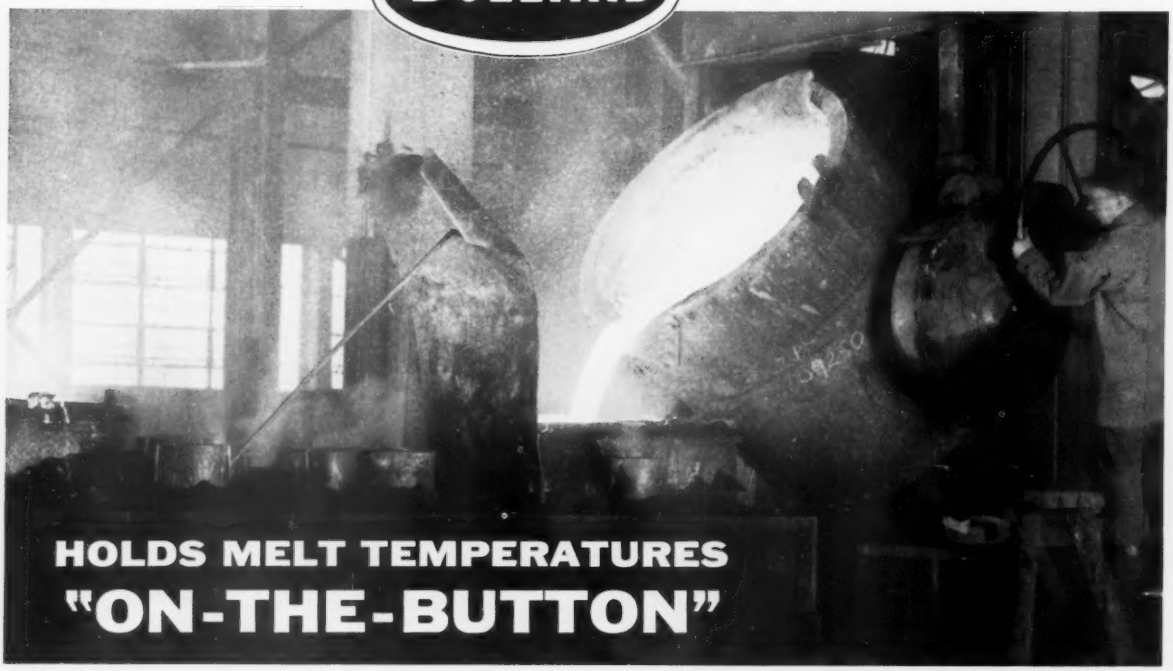
CITY PATTERN

FOUNDRY AND MACHINE CO.

1161 HARPER AVENUE • DETROIT 11, MICH.

PHONE: TRinity 4-2000

Ultra-modern **BULLARD** foundry



HOLDS MELT TEMPERATURES "ON-THE-BUTTON"

▲To get the best possible machine tool castings, The Bullard Company uses Foxboro Air Weight Control in their new 7-million dollar foundry. Ladle is pouring a 29,000-lb. casting.

...with Foxboro Air Weight Control

At the new multi-million-dollar Bullard Company foundry in Bridgeport, Conn., Foxboro Air Weight Controllers automatically help produce top quality castings for world-famous machine tools.

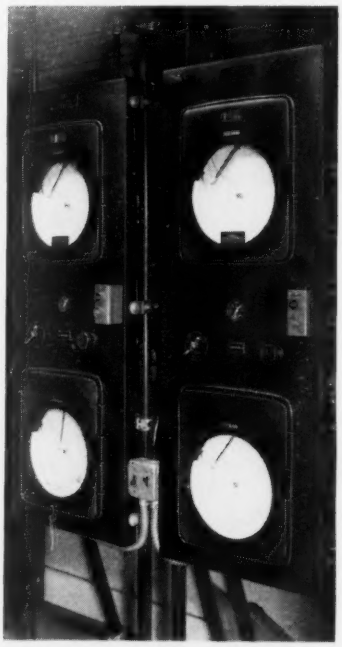
"We set them in the morning and forget them", says Stanley H. Bullard, foundry superintendent. "And they hold the set point all day — right on the button."

Foxboro Air Weight Controllers meter blast by *weight of air* instead of volume. They help cut fuel costs . . . practically eliminate pigging . . . provide accurate chart records of the melt. Variations in temperature, barometric pressure, cupola resistance, and line voltage are compensated automatically.

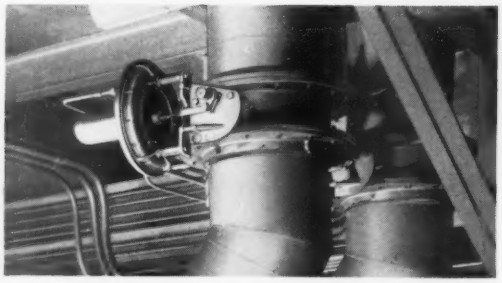
Foxboro Air Weight Controllers have been foundry-proved in over 1700 installations. See what they can do for you by writing for Bulletin 10-10, or by asking your nearby Foxboro Field Engineer. **The Foxboro Company, 329 Neponset Ave., Foxboro, Mass., U. S. A.**

FOXBORO **AIR WEIGHT CONTROL**

REG. U.S. PAT OFF.



▲The key to better castings at The Bullard Company is this control panel, serving two 12-ton per hour cupolas. Top instruments are Model 40 Air Weight Controllers. Below are continuous Windbox Pressure Recorders.



Foxboro Butterfly Valve installed in one of the 24-inch blast lines. Valve position is controlled by Foxboro Air Weight Controllers shown at right.

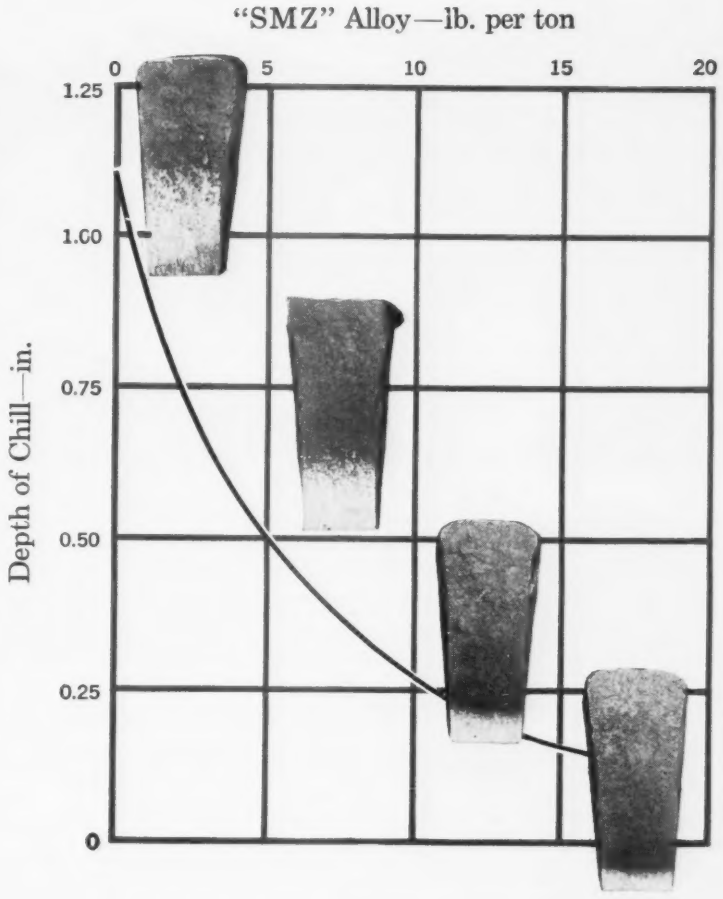
IMPROVE MACHINABILITY OF GRAY IRON

...eliminate hard spots with SMZ alloy

The chill blocks at the right clearly show how the chilling properties of gray iron are sharply reduced by small ladle additions of SMZ alloy, a strong graphitizing inoculant containing silicon, manganese, and zirconium. The blocks were poured from a 3.15 per cent carbon, 1.80 per cent silicon iron. Additions of 5, 8, and 16 pounds of SMZ alloy per ton (0.15, 0.25, and 0.50 per cent silicon) progressively reduced the chill depth from 1.09 in. for the untreated iron to 0.19 in. for the iron which received the heaviest addition.

The exceptional ability of SMZ alloy to eliminate chill in corners and thin sections vastly improves the machinability of iron. Foundries have reported that inoculating iron with SMZ alloy increases the machining rate by as much as 25 per cent. As little as 2 to 4 pounds of the inoculant are sufficient to eliminate hard corners and edges in light castings. For harder irons of low carbon and silicon contents a larger addition of the alloy may be required.

Write or phone your nearest ELECTROMET office for more information on this important ladle-addition alloy. Ask for the booklet, SMZ Alloy—An Inoculant for Cast Iron. An ELECTROMET representative will also be glad to give you all the technical details. ELECTROMET METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 E. 42nd Street, New York 17, N. Y. *Offices:* Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, Phillipsburg, N.J., and San Francisco. *In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.



METALS DO MORE ALL THE TIME ... THANKS TO ALLOYS

Electromet
FERRO-ALLOYS AND METALS

UNION CARBIDE

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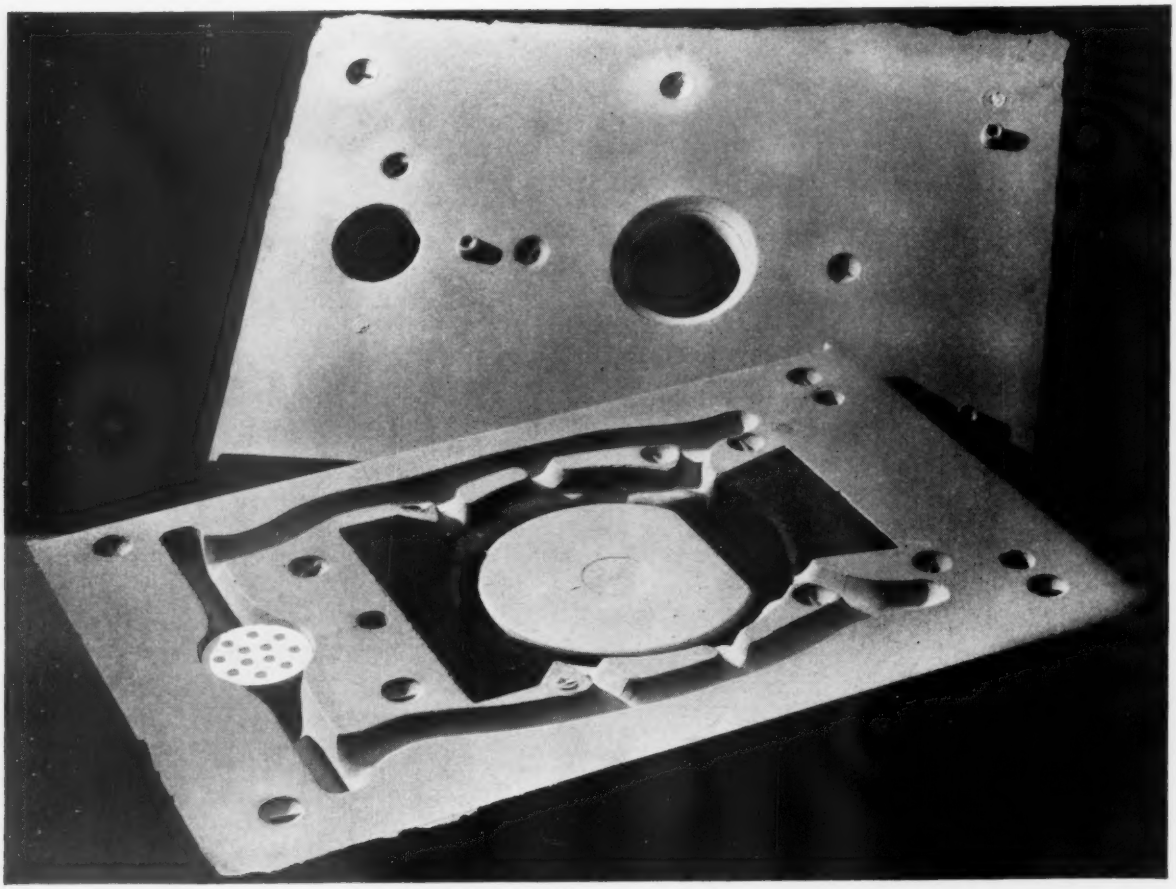
DRY MIX OR COATED
DUMPED OR BLOWN
HOT OR COLD

for the **finest** in shells and cores



DUREZ RESINS are matched to your methods

Top Savings . . . of labor, of time, of materials—are achieved in shell mold and core production where the resin is matched to the method and equipment employed. Each technique imposes different resin requirements from the others.

Durez Resins . . . perfected by working directly with foundries—can help you make sure of optimum results, whichever methods you use. For each process there is a Durez phenolic resin that produces shells or cores of consistently high strength and uniform density. To get remarkable detail and freedom from rejects, why not try the one formulated for your procedure?

Write for a trial shipment and technical data.

FOR DRY MIX SHELL MOLDS – *Durez 18123,* a fast-curing resin of superior hot and cold strength. Permits most economical sand-to-resin ratios.

FOR COLD COATING SAND – *Durez 18250,* a powdered phenolic designed for producing shells or cores, either dumped or blown. Its excellent strength makes thinner molds practical.

FOR COLD COATING WITH LIQUID RESIN – *Durez 18115,* liquid resin and 18117 accelerator in some cases are preferred to the powdered resin.

DUREZ®

Phenolic Resins that Fit the Job

DUREZ PLASTICS DIVISION

HOOKER CHEMICALS PLASTICS

HOOKER ELECTROCHEMICAL COMPANY
1009 WALCK ROAD, NORTH TONAWANDA, N. Y.
Export Agent: Omni Products Corp., 460 Fourth Avenue, New York 16, New York

"Our equipment has to produce — so we got PANGBORN BLASTMASTERS"

says Mr. W. BLACKMER, Foundry Superintendent,
Muskegon Piston Ring Company, Sparta, Michigan

4 Blastmaster® Barrels replace 6 air blast barrels and 10 tumbling mills . . . cut two and three shifts a day to just one

"We maintain over 4,000,000 finished castings in stock for immediate shipment. To keep this stock replenished, our blast cleaning equipment has to really turn out the work. And we want a good job, too! We have found that our Pangborn Blastmasters fill the bill on both points—production per manhour is amazing."

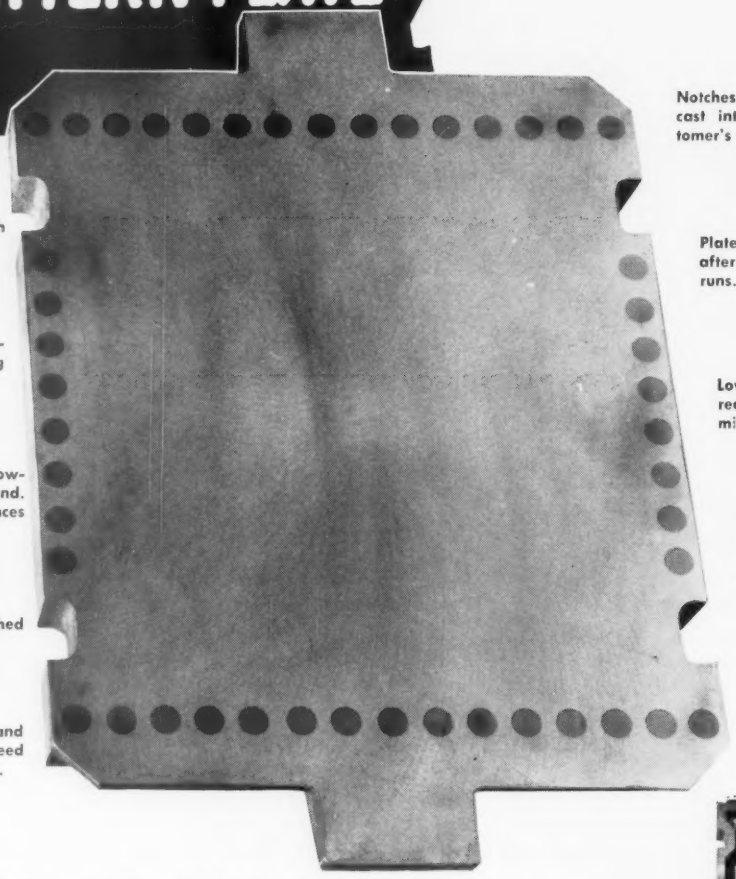
If *you* need blast cleaning equipment, look at all makes. Then check the Pangborn Blastmaster. You'll find it offers many exclusive features plus a choice of sizes to fit your needs—1½, 3, 6, 12, 18 and 27 cu. ft. Write for Bulletin 703 to PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Maryland. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn ROTOBLAST® cleans cheaper

Circle 628 on Inquiry Card—Page 51

IMPORTANT NEWS about a revolutionary new PATTERN PLATE

Kindt-Collins presents the new Master TUFF Cope and Drag PLATES assuring new standards of availability, economy, performance, and accuracy in plates of this type. Note the many outstanding features offered by these plates, and adopt them as standard in your shop and foundry, assuring you and your customer of superior results.



Notches for flask pins cast into plate to customer's order.

Vibrator lugs on both ends.

Plates can be reground after long production runs.

Steel inserts permanently cast in plate along flask line.

Lowest maintenance required of any aluminum plate.

Standard flask allowance is 1″ all around. Special allowances available on order.

Available promptly in flask sizes from 14″ x 14″ to 26″ x 40″. Larger sizes to order.

Standard plates finished to 2½″ thickness.

Plates ground top and bottom. Guaranteed straight and parallel.

Now Master TUFF Cope and Drag PLATES offer the ultimate in DURABLE cope and drag match plates for all your requirements! Available in either high-grade cast aluminum alloy or cast iron, with or without steel inserts, or machined to take steel wearing strip, Master Tuff-plate meets *unusual heavy-duty* requirements on jolt stripper or jolt rollover machines. Send for details of broad selection of immediately available standard sizes . . . or quotations on special made-to-order plates.

All Master Tuff-plates are heavily ribbed to prevent warping or damage from heavy use. The photo at the right shows the ribbing on a small plate. On larger plates the ribs are proportionally greater in number.

KINDT-COLLINS MASTER PRODUCTS

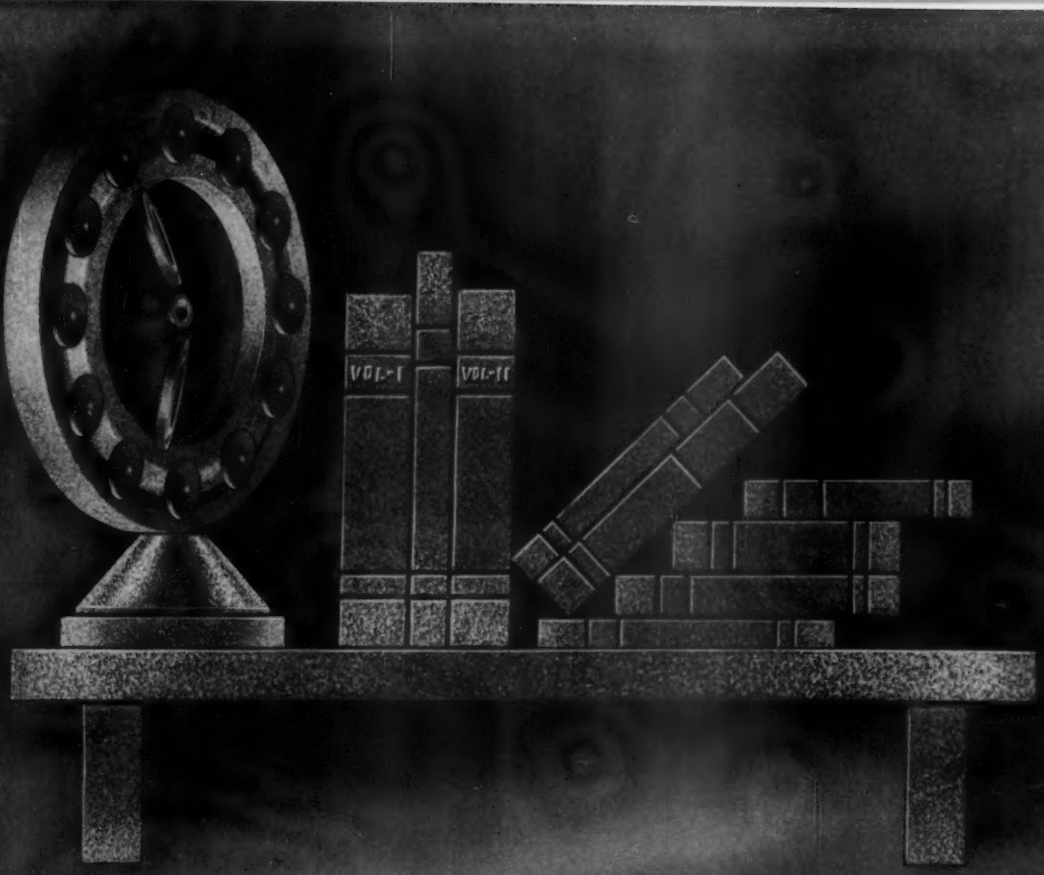
THE KINDT-COLLINS COMPANY

12653 Elmwood Ave.
Cleveland 11, Ohio

Quality Products for Industry . . . Proved by Performance

Circle 629 on Inquiry Card—Page 51

Circle 630 on Inquiry Card→



Time for a Grinding Profit-Audit. Ask Today for a PENINSULAR Survey.

It takes only a few minutes to determine the need for a quick checkup of your grinding operations. Peninsular abrasive engineers can often "throw the book" at high costs by suggesting the wheel specification that will provide you with the greatest possible economy and efficiency from your job.

On a typical floor-stand snagging operation, shown to the left, the Peninsular wheel bettered the prior standard by 29%, based upon wheel cost per pound of metal removed. You can enjoy similar, agreeable results from a Peninsular Profit-Audit, conducted by one of our abrasive engineers. Next time he calls, ask him to survey your grinding operation, make recommendations and demonstrate how extra profits can be realized.

Resinoid and Vitrified Grinding Wheels

PENINSULAR

GRINDING PENINSULAR WHEELS

District Representatives and Distributors in All Principal Cities

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS CO.—DETROIT, MICH.

Introducing Harbison-Walker

For Shell Molding Steel Castings

TRIED AND PROVED THROUGH RESEARCH AND PRACTICE

Forsterite grain is highly refractory magnesium silicate possessing physical properties which make it especially suited for resin-bonded shell molding. Its specific heat, thermal conductivity, high temperature stability and uniform thermal expansion—all contribute to its excellent performance.

As the result of the optimum chilling effect of forsterite grain, sufficient strength develops in the skin of the steel casting to resist outside gas pressure as well as inside ferrostatic pressure, and a smooth casting surface is assured.

H-W FORSTERITE GRAINS

are supplied in controlled sizings best suited for securing the most satisfactory shell molded casting surfaces.

H-W FORSTERITE FLOUR

is furnished for use as an additive to the H-W FORSTERITE GRAINS and resin mix to provide for the ultimate in surface smoothness, particularly of castings with heavy sections.

Write for further engineering data on H-W FORSTERITE GRAINS.

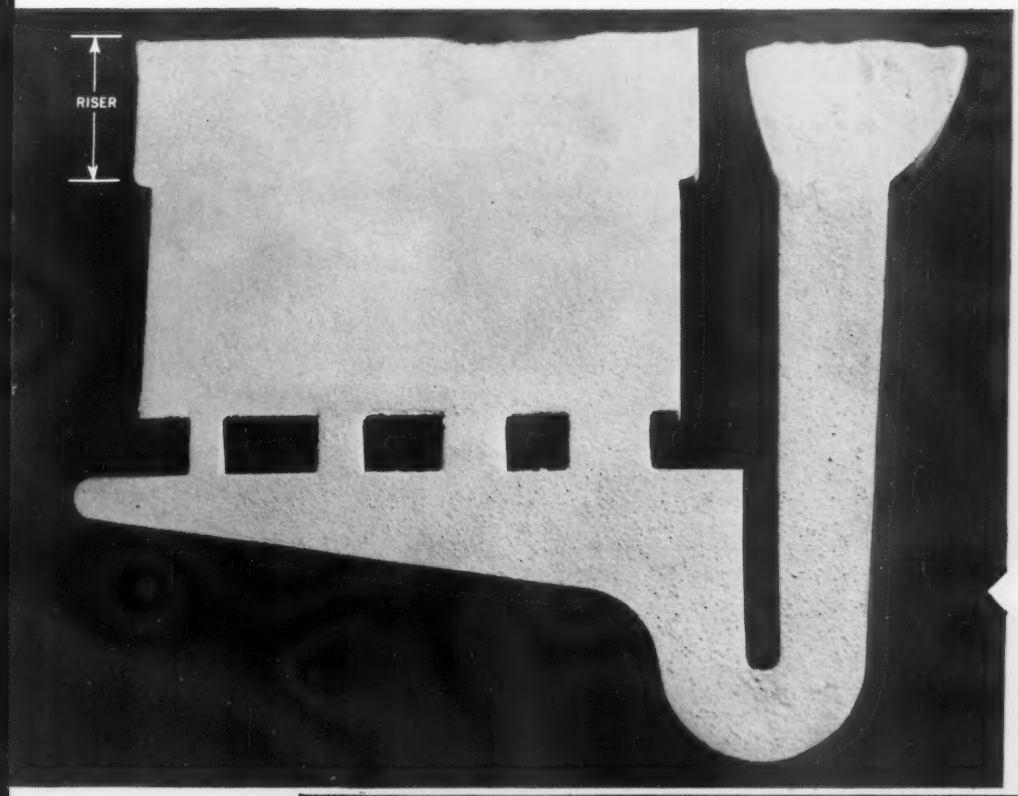
Adding another Quality Product to the World's Most Complete Refractories Service

Harbison-Walker Refractories Company

and Subsidiaries

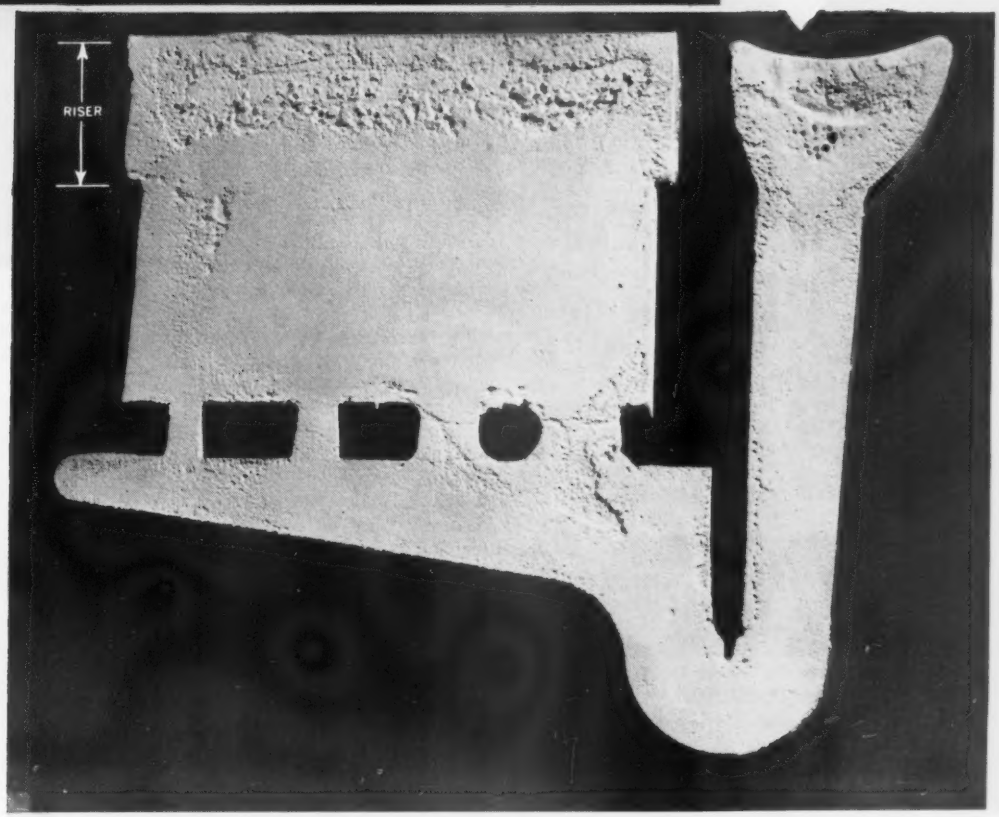
General Offices: Pittsburgh 22, Pennsylvania

FORSTERITE GRAINS



Low-carbon steel casting from H-W FORSTERITE GRAINS in shell mold with 5 percent resin.

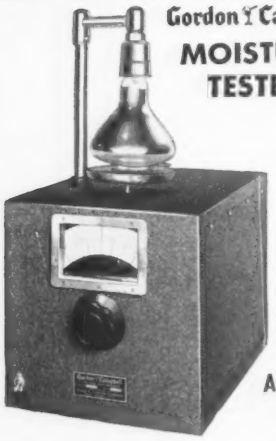
Low-carbon steel casting from silica sand in shell mold with 5 percent resin.



Guessing Moisture Content?

IT DOESN'T PAY!

USE THE Gordon-Campbell MOISTURE TESTER



ACCURATE FAST

The moisture content of sand mixtures is too important a factor in the production of good castings to be determined by guesswork. Frequent testing is the only sure guide to maintaining the most favorable moisture percentage.

The Gordon-Campbell Moisture Tester offers an easy, fast, accurate method of finding moisture content. With only a few minutes required for a test, the sand can be corrected promptly to avoid scrap losses.

Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units.

Gordon-Campbell sand testing units conform to the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRYMAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

GORDON SERVICE

CLAUD S. GORDON CO.

Manufacturers · Engineers · Distributors

607 West 30th St., Chicago 16, Ill.
2027 Hamilton Ave., Cleveland 14, O.

Circle 632 on Inquiry Card—Page 51

Readers' Comment

Help Is Appreciated

TO THE EDITORS:

We thank you very much for taking an interest in our problem, together with your letter of June 5 and the sketch attached. This information will be very helpful to us for soon we will be obligated to meet the requirements of a stringent air pollution code.

R. L. MULLEN, Manager
Machinery Department
Honolulu Iron Works Co.
Box 3140
Honolulu 2, *Hawaii*

Early B. & P. History

TO THE EDITORS:

I have read with interest Harold Henderson's "Meditations of a Sand Man" in the August issue. The story of the early foundries in the West Coast area was both interesting and enlightening. Naturally, the paragraphs headed "Sand Slingers" was of extreme interest to us here at B & P.

I am sorry that we did not have the opportunity of giving you some information both regarding the original Sandslinger and about Messrs. Beardsley and Piper, which we could have done, and we hasten to do now, correcting some of your assumptions. In other words, we shall try to be the "someone who will enlighten you on the point," as was suggested.

The original Sandslinger head is here in our archives and, incidentally, was displayed at the 1956 Foundry Exhibit at Atlantic City. This is the original model from which the patents were granted. Apparently, we did not display it prominently enough in Atlantic City, but we did have it rotating on a Roto-Mold turntable, with a card identifying it.

Regarding Mr. Beardsley, his father was a banker in the town of Klamath Falls, Oreg., and in addition owned a machine shop. Elmer Beardsley worked for his father in the operation of the machine shop. This was prior to the foundry part of the business. Walter Piper, who had served his time as a machine apprentice, and had worked with some of the railroads on the West Coast, eventually became employed at the Klamath Falls Iron Works as a lathe hand. Later, when the foundry became a part of the business, he became interested in molding.

It continued throughout the careers of both men that Mr. Beardsley basically handled the business end of the company, and Mr. Piper devoted most of his time to the shop and development end of the business.

C. V. NASS
Vice President and
General Manager
Beardsley & Piper Division
Pettibone Mulliken Corp.
Chicago 39, *Ill.*

Change Your Thinking

TO THE EDITORS:

About two months ago I happened to overhear the sales pitch of a young man trying to sell a ladle lining material of which he knew very little.

He did not sell the superintendent of this foundry. He did, however, have so much confidence in the material that he gave the material away. Gave about $150 worth plus trucking charges. No strings, just try it.

The superintendent bought this free gift. The price he paid? His assurance he would try it and soon.

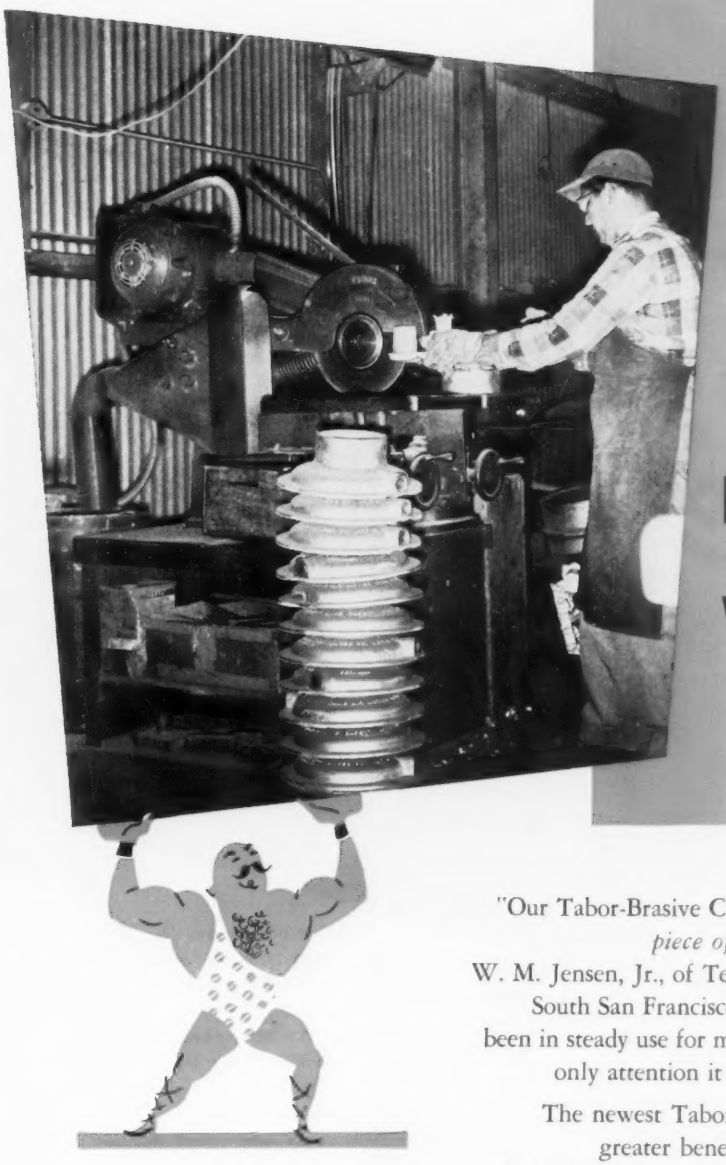
The deal was sealed with a handshake and as I learned two months later, the gift arrived as promised and was installed as promised. Not only was the gift sent in at no charge, but the salesman and a technical man spent approximately 16 manhours supervising installation. I estimate this should be worth another $100 free gift.

I never did get to know the salesman's name, but my curiosity had been aroused so on my next visit I asked the superintendent how his free lining material worked out. His answer: "The best material I have ever seen in my 40 years in the foundry." He went on to say, "No cracks, no hot spots, no skull or bridging and absolutely clean. In fact I have re-ordered and going 100 per cent as ladles require relining."

The moral of this is that in order to get more casting sales, I believe it is necessary for a good many foundries to change their thinking to more progressive lines. You can't go along with old methods and materials just because they have been used for the past 100 years. A clean shop with modern methods and materials will clear the way for hurdling competitive bottlenecks.

H.L.M.

26 *Parkview Terrace*
North Plainfield, N. J.



"... the only trouble-free piece of equipment we've ever owned"

Model B-7½-AC Tabor-Brasive Cut-Off Machine, in ten years of maintenance-free service at Terminal Brass and Aluminum Foundry, South San Francisco, California. Strictly a jobbing foundry, Terminal cuts both aluminum and brass, large and small items, in volume or on small orders.

"Our Tabor-Brasive Cut-Off Machine is the *only trouble-free piece of equipment we've ever owned,*" writes W. M. Jensen, Jr., of Terminal Brass and Aluminum Foundry, South San Francisco. "We bought it new in 1947, and it's been in steady use for more than 15,000 hours. Absolutely the only attention it ever needed was two V-belt changes!"

The newest Tabor-Brasive Cut-Off Machines bring even greater benefits to the production foundry. On the redesigned 5 hp machine, there's increased table room and a full range of cutting service. The 15 hp machine, with its new hydraulic table lift, gives less operator fatigue and faster cuts. Cuts any metal. Brass, aluminum, iron or steel — they're all the same to a Tabor Machine.

If mechanization will meet your problems, the man to see is the Tabor Man. Call him — or write for detailed data.

TABOR

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Circle 633 on Inquiry Card—Page 51

STRENGTH

WHERE YOU NEED IT MOST!

- Solid rolled flange with full width bearing
- Sturdy all-steel web of 1/4" or 3/8" thickness
- Solid center reinforcing bar to resist torsional strains
- Sturdy all-steel web of 1/4" or 3/8" thickness
- Solid rolled flange with full width bearing

Sterling Heavy Duty Flasks in a large Midwest foundry

Sterling Heavy Duty Flasks enable you to meet the toughest foundry production schedules. That's because Sterlings are fabricated from hot rolled high carbon steel with copper bearing and welded into a single rigid unit. They have strength where stress is greatest . . . solid rolled flanges . . . thick all-steel webs . . . and reinforcing ribs welded around each section to resist torsional strains. Engineered for durability, Sterlings give you extra strength, with less weight, for easier handling. For complete foundry flask service — consult STERLING.

Sterling

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LONDON • BEDFORD • JARROW-on-TYNE, England

Manufacturers of Foundry Equipment for Almost a Half Century

A7-4511

A Promise Kept

This is our birthday.

Sixty-five years ago this month, John A. Penton, an ambitious young foundryman, published the first issue of The FOUNDRY in Detroit.

In his salutation Editor Penton said:

> "The FOUNDRY will stand squarely for what, in its opinion, are the best interests of the whole business. No section thereof will be overlooked, and the importance of none unduly magnified."

The present editors are proud of FOUNDRY as it is today, proud of its standing in the industry it serves and in the field of business publications, and proud that the promise of Editor Penton in Vol. I, No. 1 has been kept throughout the years.

It will continue to be our guide in the future.

Frank G. Steinbach
Editor

A Design Engineer Looks at . . . Casting

Here is one casting buyer's profile of a good casting salesman: He is honest and considerate, doesn't use high-pressure selling, keeps confidences, knows his product and process, co-operates closely with customers, is helpful about quoting costs, meets delivery promises and in general uses service to make sales

By BYRON L. ERTSGAARD
Assistant Chief Engineer
Toro Mfg. Co., Minneapolis

TO the customer, a salesman is his company, and the company is its product. I also regard a technical salesman as a friend. I regard him as a source of inspiration, for he brings into the office a fresh point of view—a new perspective. A salesman frequently has the answer to a problem we are facing.

I am reminded of a time when we were having bearing trouble with a new transmission. When we were about to give up what we thought was an impossible design, a representative of one of the bearing companies came in, and we told him our story. After he had analyzed our problem, he applied some tricks of the trade he had learned in the automotive field, and we soon had a satisfactory transmission. I will not forget that salesman easily.

What do I expect of a salesman?

Honesty—I expect my salesman friend to be an honest friend, for without honesty there can be no lasting friendship. I expect him to be honest in the presentation of the story of his product—to tell me its limitations as well as its advantages.

Consideration—Since a friend is always considerate, a phone call to establish a definite appointment is appreciated. In these days of extreme pressures on people in business, it is a little presumptuous to walk into an office without an appointment. The person on whom the salesman is calling may very well be tied up with someone else—someone who has taken the time to make an appointment. With this approach, a salesman can expect the customer also to be more considerate and not to make unreasonable demands on his time.

No High-Pressure Selling—Pressure selling has no place in technical sales. If the product is right for the job, it should sell itself. A salesman needs only to build confidence in the eyes of his customer—confidence in him and in his company. If the customer has such confidence in a salesman, he will have confidence in his company—and the converse is equally true.

Keeping Confidences—It should be obvious that a good salesman does not discuss one company's business with another company, but it is surprising how often this confidence is broken. The man who is bursting today to give us all the confidential scoop on our competitor will be calling on him tomorrow.

Know Your Product—On the technical side of technical selling, there is no substitute for a salesman's knowing his product and his process. The engineer looks to him for technical information.

On his first meeting with a potential customer, a salesman can, by adroit questioning, determine the extent of the engineer's knowledge of his product. He can indicate its advantages, show him pictures or samples of castings his foundry has made and point out the superiority of castings over other forms of fabrication with regard to shapes and appearance of design details. He can show how his company is able to hold close tolerances

Salesmen

and get superior finishes through the use of new techniques, processes and equipment.

Co-operation Is Vital—The salesman should work closely with the design engineer to get out as many bugs as possible before the design is released. This task also will require him to work with the manufacturing and tooling people to make certain that their requirements are met.

The salesman should get to know the company he is dealing with. He should study its organization and operation and make an effort to determine that all angles have been covered before a pattern is made. It will tax the ingenuity and diplomacy of the best salesman to accomplish this job without stepping on someone's toes, but once he has accomplished it, he will be respected for his judgment and advice, and his company will pour more and better castings with less rejects and fewer hitches in its production schedule.

Cost Quotations—Any design engineer worth his salt is extremely interested in costs and leadtimes. Salesmen should be prepared to give him the best advice they can. Depending on the stage of development, he may want only indications of comparative costs of alternate designs, not exact cost quotations. If a salesman can co-operate in this way, he will save his own estimators considerable time, but he must be careful. If the engineer wants a firm quotation, the matter should be handled through regular channels.

While we are discussing quotations, let's explore another area of service. I dare say that not more than 10 per cent of the castings designed can't be improved to some extent by foundry personnel. Good salesmen try to learn the application of the part; then they come back with two quotations—one for the part the way it was designed (this is important) and another for the cost if certain details of the design can be changed.

An engineer who is trying earnestly to make the best product he can for the lowest cost will welcome suggestions if they don't interfere with the function of the part. If suggestions are not feasible, they may stimulate some thoughts on the part of the engineer, or he and the salesman may be able to work over the design together so that both objectives can be accomplished.

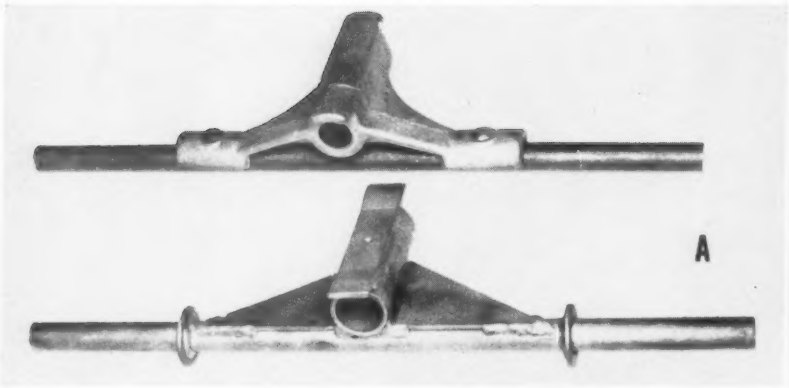
Let me cite an example here. We designed a clutch for use on a new product which included two critical diecast aluminum parts. Unless those parts could be produced as die castings, we could not afford to make the clutch.

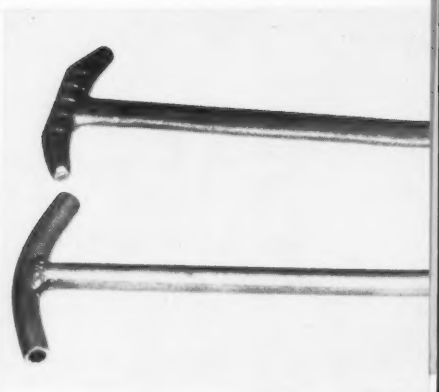
We submitted prints to two diecasters. One came back with the flat statement, "It can't be done." The second came back with the statement, "We can't do it the way designed—but we can do it this way." We studied the second proposal and decided we couldn't use the suggested design, but we did see where the difficulty lay with our original design.

After several conferences between the diecaster's engineering staff and ours, we were able to come up with a workable design that was economical to cast. That company will enjoy several thousand dollars worth of business on those parts. It's obvious to whom we will turn the next time we have a new die casting design. We also have a number of sandcast parts in production which are the result of co-operative design programs.

Sample Parts—In working up a new design with an engineering department, a salesman almost always is asked whether he can supply sample parts. He should be realistic about promises of delivery of samples. With patterns to make and parts to cast, the time necessarily will be considerable, but it is disconcerting for the designer if the salesman can't make delivery when it is promised. The designer co-ordinates all of the sample parts for his prototype, and a delay in receiving sample castings may cause a delay in the whole program.

While discussing samples, the salesman should point out any differences that might be expected between the samples and the production parts—differences such as possible distortions or dimensional inaccuracies due to the use of loose or temporary patterns. In many instances, the salesman may be able to work out a scheme whereby samples are provided from master or master-master patterns which will be used later to make production patterns. This arrangement saves the customer some expense and reduces the lead time for the first run of castings.





Sell Foundry Facilities—In selling his company to the customer, a salesman should sell the services that it has to offer. Does the company have a laboratory that can help to evaluate the designer's part? Can it run tensile and compressive tests for him? Abrasion tests? Hardness tests? Any services of this nature are appreciated. The designer also is interested in a company's quality control program and how it will assure him of a continued supply of uniform castings. A salesman should not be secretive about his facilities. Instead, in fact, he might invite the designer over for a plant tour.

Is the foundry developing new techniques? Does it have new equipment that will make possible better castings at less cost? What is developing in the industry? The design engineer is anxious to keep up with the latest in the foundry field, but he also has to keep up in such fields as plastics, bearings, transmission design, commercial fasteners, lubrication, engines, electric motors, metal stampings, rolled shapes, extrusions and many others, as well as with the economic situation as it affects his own particular product.

The good salesman does him a favor by helping him to keep up to date on castings. In the press of events he may get the idea that the castings industry is static—that no new improvements are being made or that some other new process or material is replacing castings. The castings salesman can let him know that the industry is alive by showing him the latest developments.

If the salesman's foundry has a publication, the designer should be on the mailing list. He should be told what the foundry is doing in other fields. There may be an application he can use on his product.

Look for Castings Applications—And that leads me to another important point. An alert salesman studies his customer's products wherever possible to see whether he can discover possible applications for castings. He looks at products on the showroom floor, attends trade shows where they are displayed and stops to discuss them with the user. Let me cite one example in this regard.

About three years ago we produced our 1 millionth lawn mower. It happened to be a very complex mower, packed full of mechanisms and equipped with many levers, brackets, etc. This mower was put on display in the lobby of our headquarters building. One day when a castings salesman was cooling his heels in the front lobby, waiting to get in to see the purchasing agent, he looked over this mower and noticed a few parts that he thought could be converted economically from weldments to castings.

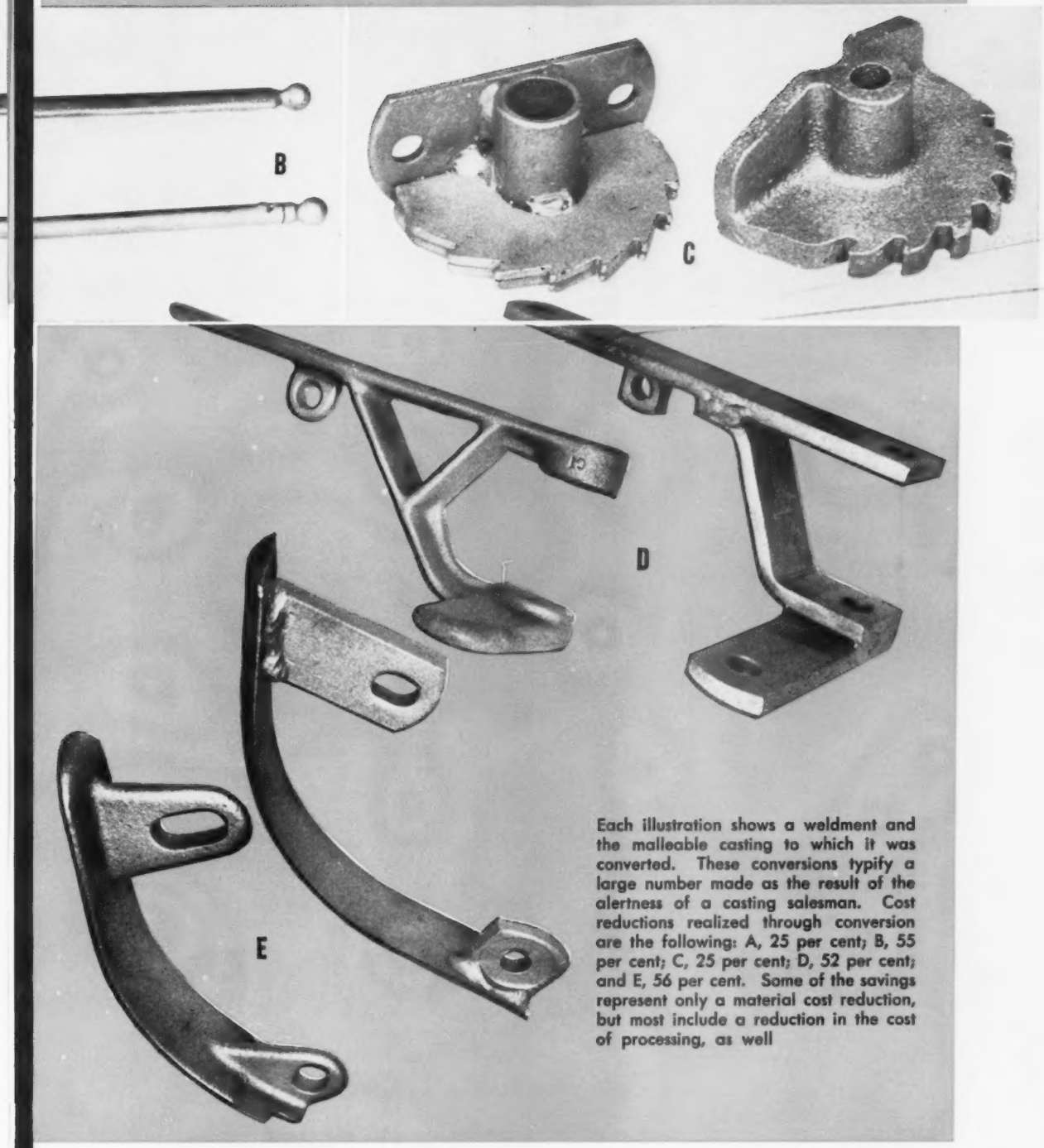
He somehow obtained an owner's manual, marked the parts and came out to see me about the idea. As I recall, not all of the parts he selected were suitable for conversion, but the idea led to a sort of chain reaction that ended up in the conversion of 19 parts to his castings on this one mower alone. That incident certainly opened our eyes. We started to look at some of our other mowers as well, and there is no telling where the end of this trail will lead.

Needless to say, everyone in our company is a lot more familiar with the potential of that salesman's castings than they were, thanks to him and the 1 millionth mower. So it pays to be alert, to know a customer's products and problems. The salesman who does is better able to serve his customers, and service makes sales.

One parting thought, with regard to relationships with the purchasing office. The PA is a necessary evil in any company. Our company works largely on the team basis in all product development. When we do any preplanning work with a vendor, we ask that a carbon copy of all quotations and correspondence be sent to the purchasing office. In this way, the purchasing agent is up to date at the time the design is released, and he knows the whole story of the development of the design.

If he is familiar with the services that a salesman has rendered and has a knowledge of the part at the time of release, he is more likely to give favorable consideration at the time the order is placed. The engineering department recognizes that the purchasing agent will have the final say as to who is going to get the business, but I feel that much duplication of work can be eliminated if he is kept posted during the development stage.

The castings salesman has an interesting job.



Each illustration shows a weldment and the malleable casting to which it was converted. These conversions typify a large number made as the result of the alertness of a casting salesman. Cost reductions realized through conversion are the following: A, 25 per cent; B, 55 per cent; C, 25 per cent; D, 52 per cent; and E, 56 per cent. Some of the savings represent only a material cost reduction, but most include a reduction in the cost of processing, as well

He can glean ideas and applications for his product from many companies and apply this experience to new situations. He has a product that is well established by long years of satisfactory service under many varied conditions. Yet he also has new approaches, new techniques, and new processes, all tempered by these years of experience.

He needs only to go out and sell, to know his customer, including his product, his organization and his problems. He should use these factors, together with the knowhow of his company, to give the customer a better product. Castings are old and established, but they are no better than the service that is put behind them. There are new accounts to be established, there are designs to be improved, and there is business in the bushes.

Fig. 1—Outer surface of 5500-lb casting was made against silica facing with a heavy olivine wash, and inner surface was made with an olivine facing. Casting appears as it came from shakeout

How To Use

OLIVINE SAND

For Molds....Cores.....
Ladle Linings...Washes

Experimental work with olivine sand at Columbia Steel Casting Co., Portland, Oreg., proved so successful that olivine now makes up 25 per cent of all new sand that the company uses. Here's the story

By W. A. SNYDER
Associate Professor of Engineering
University of Washington
Seattle, Wash.

COLUMBIA Steel Casting Co., Portland, Oreg., has been a consistent and significant producer of steel castings since it was founded in 1900. It is particularly well known for production of high-manganese castings, which it has produced for more than 50 years. At present, about 70 per cent of the company's total tonnage is manganese work.

In summer, 1956, Columbia started serious experiments with olivine sand when it obtained a 7-ton shipment of Northwest olivine after first using a few hundred pounds for test castings. This olivine came from the same deposit as the material that has been used since 1950 at the University of Washington foundry. It is a commercial product, however, and has a screen analysis superior to the "handmade" aggregate first used at the university. The first shipment of olivine was to be used to produce test castings, and results were to be evaluated by O. W. Kramer, metallurgist, and M. Bailey, sand technician.

The first test casting was a corrugated crusher jaw. It showed such a remarkable improvement over previous castings that the olivine was immediately earmarked for the production of that casting. More material was ordered immediately, and after a short interruption the experimental work was continued. This work, carried out under the direction of Mr. Kramer, has proved so successful that today approximately 25 per cent of all new sand used by the company is olivine. At present, this material is used to produce "problem" castings, but the foundry may in time be converted to total olivine operation.

Olivine has not, however, proved to be a "miracle" material which automatically solves all casting problems. As might be expected, use of a new material has presented new problems to operating personnel, but results have justified the time spent in solving them. On the whole, the conversion to olivine at this foundry has been a rather smooth operation with less trouble than one might expect from the introduction of a completely "new" material.

Manganese Steel Casting—Olivine has proved most valuable in this foundry for the production of heavy manganese steel castings. It does not react chemically with manganese at the mold-metal interface and offers a theoretical as well as a true practical advantage for this use. Mr. Bailey has found that simple sand mixtures are definitely advantageous when olivine is employed for molding sand. Many additives that improve silica sand mixtures seem to offer no advantage in olivine mixtures. These simple mixtures are helpful to the foundry control program, and the use of olivine molding sands for manganese steel castings has resulted in better castings at lower cost.

Lower cleaning costs are the most obvious saving resulting from the new practice, but often a reduced machining time brought about by complete absence of swelling also is of great importance. Improved appearance of castings has encouraged the foundry to improve related procedures and thus further increase savings. Since no surface reaction occurs with this molding material, there is considerable reason to believe that the service life of the castings will be improved.

Case Histories—The casting in the foreground of Fig. 1 is shown just as it came from shakeout. It has not been brushed, scraped, blasted or subjected to any cleaning operations. Weight of this casting after cleaning is 5500 lb. The inner surface was produced by olivine facing sand—mixture M-2 in Table I.

The facing was applied in a great enough thickness to prevent a breakthrough of the silica backing sand when the mold was rammed under a sandslinger. The hooks were formed by oil-bonded olivine cores produced from mixture C-1. The outer surface was produced against silica facing, which was given a heavy olivine wash.

It has been noted that where the metal tends to pull away from the mold surface on contracting, silica sand protected by a very heavy olivine wash often gives satisfactory results; on the other hand, where the metal contracts onto the sand, an olivine facing sand must be employed.

Fig. 2—Roll shell casting is shown as it came from shakeout. It weighs 3700 lb when cleaned

This casting was fed by heat-producing thermit sleeve feeders that contained olivine core mixture.

Cleanup time for this casting has been reduced 22 hours. Of this saving, two hours can be attributed to the use of the thermit sleeve risers; the other 20 are a result of the use of olivine products and improved techniques made possible through their use. Machining time on this part has been reduced some ten hours as a direct result of the use of olivine facing to form the surface to be machined. This saving results from the casting's being true to shape and from the improved surface condition.

The roll shell casting in Fig. 2 also is shown just as it came from shakeout. This high-man-

TABLE 1—Olivine Sand Mixtures

—Molding Sand Mixtures—		
M-1:	100 lb	No. 70 Olivine
	5 lb	Western Bentonite
	½ lb (max)	Cornflour
	½ lb (max)	Dextrine
	3.2-3.5 lb	Water
M-2:	150 lb	No. 70 Olivine
	100 lb	No. 40 Olivine
	50 lb	No. 140 Olivine
	16 lb	Western Bentonite
	1 lb	Cereal Binder
	8 lb	Water
—Core Wash—		
W-1: (Dry Mix)	100 lb	No. 200 Olivine
	10 lb	No. 140 Olivine
	4 lb	Lion Binder
	4 lb	Western Bentonite
—Core Sand Mixtures—		
C-1:	200 lb	No. 70 Olivine
	100 lb	No. 200 Olivine
	1½ lb	Dextrine
	2 lb	Western Bentonite
	1 lb	Lion Binder
	2 gal	Water
	1 gal	Core oil
C-2:	30 lb	No. 140 Olivine
	20 lb	No. 200 Olivine
	6 oz	Cereal Binder
	400 ml	Core Oil
	900 ml	Water
—Ladle Lining Mixture—		
	93 lb	No. 70 Olivine
	6 lb	Sodium Silicate Binder
	1 lb	Pitch (optional)

ganese steel casting weighs 3700 lb when cleaned.

The inner and outer surfaces are produced against dry sand cores 4 in. thick and faced with a ¾-in. layer of olivine core mixture C-1. The backing sand is a dextrine-bonded, black silica core mix. Similar jobs are produced with solid olivine cores 1 in. thick. The use of olivine has resulted in a cleaner peel and a more accurate casting than was possible previously, and cleaning time on this casting has been reduced 12 hours. The surface produced by the olivine on this casting is uniform from casting to casting, whereas the former practice gave varied results.

The castings shown in Fig. 3 are discharge plates for a large ball mill. Like the previous castings, they are high-manganese steel; unlike the previous illustrations, however, they have been cleaned. These castings weigh only 250 lb each and present no serious problem except in the removal of the slot cores. Previously, results varied. Removing the cores and cleaning the slots often presented a difficult problem.

The core assembly for this job is shown in Fig. 4. The base core is olivine prepared from mix C-1. The slot cores are sodium-silicate bonded and set by CO_2. The sand is No. 140 olivine bonded by the addition of 5 per cent of a proprietory soluble silicate core binder. The slot cores do not flow out of their own volition, but they are easily removed. The slots are consistently clean and smooth and require no internal grinding or chipping.

Fig. 5 shows a high-manganese crusher jaw as it came from shakeout. This casting weighs 3100 lb when cleaned. The mold cavity was produced by a sweep, rather than by a pattern. As in the other instances outlined here, the facing material for this mold was a synthetic olivine molding sand backed with silica heap sand. An olivine wash with a water vehicle was applied, and the mold was skin dried with a manual torch.

Cleaning of this casting previously involved a large swing grinder, a small swing grinder, and hand grinders. With olivine facing, the small swing grinding operation has been eliminated entirely, and times for the other two operations substantially reduced. Total cleaning time for this casting has been shortened by ten hours.

Carbon Steel Castings—In general, carbon steel castings do not present the severe sand problems of high-manganese castings. The initial concern at Columbia was whether or not good carbon steel castings could be produced with olivine sands since the answer would have considerable bearing on whether or not the company might convert ultimately to a 100 per cent olivine operation.

For its first work with carbon steel, the foundry selected a typical casting and produced it in a mold entirely of olivine molding sand. The casting was not shaken out in the conventional manner; instead, sand was removed carefully until a layer about 1 in. thick remained around the casting. This sand was removed separately and remixed to provide facing sand for a second mold made from the same pattern. This procedure was repeated several times. Bonding material was added when necessary, but no new aggregate was added to the facing.

Results of this work show that surfaces of castings produced in olivine are equal but not superior to those produced with conventional silica mixtures. Considerable significance was attached to the fact that the last casting with the reused facing sand had a surface finish similar to that of the first. This achievement testifies to the ability of olivine aggregate to resist thermal shock.

At present, Columbia uses olivine for carbon steel castings only in problem areas where burn-in, penetration, deformation or expansion defects have been difficult to control with silica mixtures. In these instances, a complete olivine facing is not employed; instead, a small amount of olivine material is placed, before the general application of the regular silica facing, in the zone where trouble is expected. Olivine cores are used com-

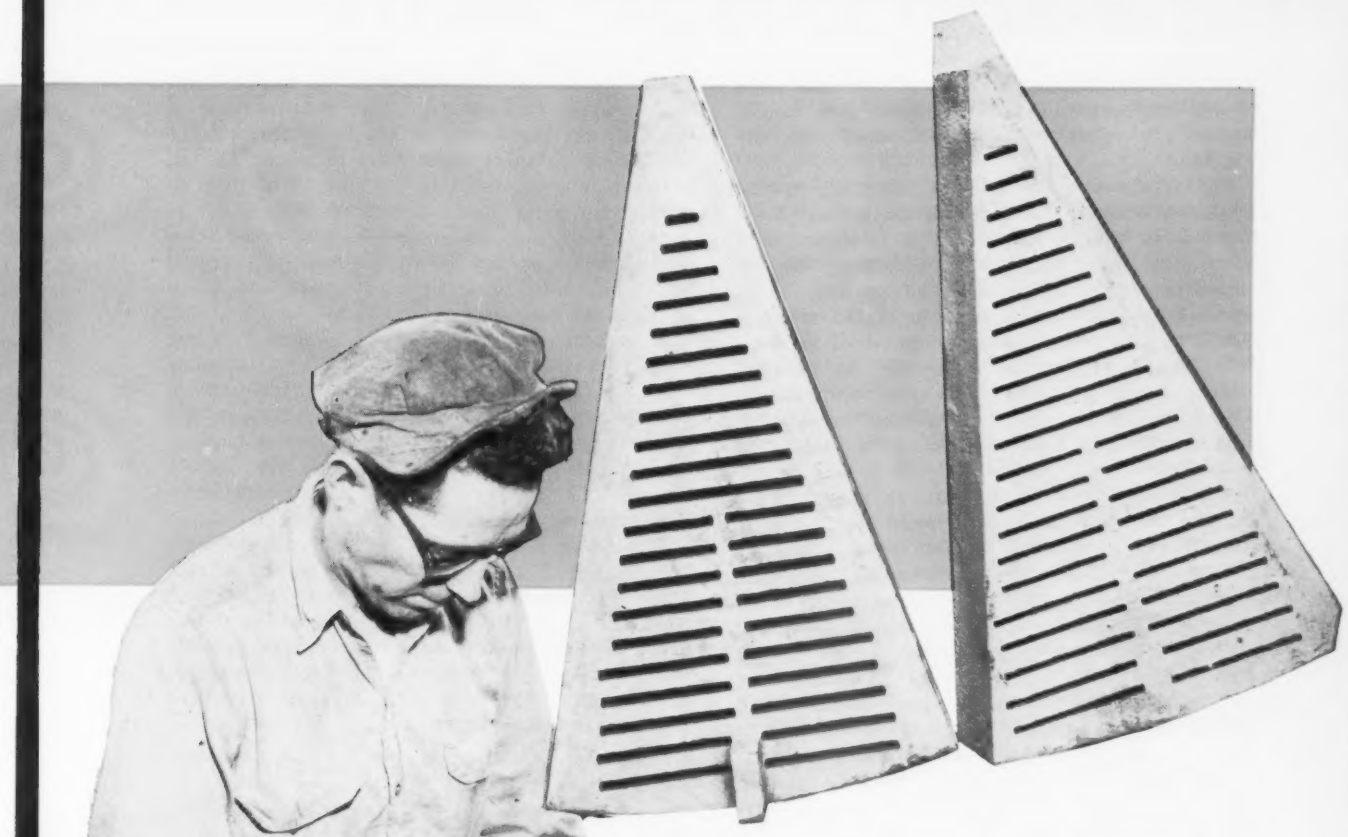


Fig. 3 (above)—These castings are discharge plates for a large ball mill. They are high-manganese steel, weigh 250 lb each and are shown after they have been cleaned

Fig. 4 (left)—Core assembly for discharge plates shown above. Slot cores are removed easily. Slots are clean and smooth and require no internal grinding or chipping

monly in applications for which other cores have proved inadequate. The olivine cores give results consistently equal to the best obtained with zircon sand.

Fig. 6 shows a carbon steel coupling casting produced with the aid of olivine cores. When cleaned, it weighs 835 lb. It is produced in a silica sand mold, and the cores forming the external pockets are faced with olivine mix C-1 to prevent "burn-in" at a location where cleaning would be costly. A small pin core which makes a hole 1¼ in. in diam is surrounded by approximately 4½ in. of metal. This core is subject to burn-in, fusion or, on occasion, total penetration. Olivine core mix C-2 was used here to prevent these faults.

The splined hole is by far the most critical part of this casting since it must fit the shaft for which it is intended without undue tolerance. Before this casting leaves the cleaning room, this large hole must be checked with "go-no go" templates. Swelling, burn-in or core distortion require extensive metal removal in an inaccessible spot should any of them occur. As used here, the olivine core results in a splined hole with a smooth surface and accurate dimensions that pass inspection without grinding or chipping.

It is interesting to note that this shop's practice often places olivine molding sand or cores in direct contact with silica sand at the metal-mold interface. No difficulty ever has been observed by joining these sands.

Mold and Core Wash—Olivine mold and core wash is used extensively for the production of high-manganese steel castings. These washes are not commercially available and must be formulated in the foundry. Mixture W-1 is a listing of the dry ingredients used in the preparation of a water-vehicle wash. With variations in the amount of water added, this mix is used successfully for both light and heavy wash coatings. As with other materials, a heavy wash must be dried carefully and thoroughly to avoid moisture problems.

An olivine wash with a volatile vehicle now is being used with increasing frequency. This wash is prepared by adding No. 200 olivine flour to a commercial vehicle and bond prepared specifically for olivine. This type of wash is applied in the conventional manner, and the vehicle is burned off. It has the advantage of not adding moisture to the facing sand, nor does it tend to draw moisture to the washed surface if the mold must stand for some time before pouring. This material is more costly than a water wash, but often pays its own way by reducing the torch-drying time.

Ladle Lining—Ladle lining procedures have been changed drastically at Columbia, with olivine aggregate playing a major role. Ladles previously were lined by a time-consuming method, and the results left much to be desired. At present, handshank ladles are lined with No. 70 olivine sand bonded with 6 per cent sodium silicate and set with CO_2. Since ramming is not required to compact the mix, a ladle can be lined completely, ready for preheating, in a few minutes.

The process of lining a ladle by this method is as simple as it is fast. The mixture first is tamped into the bottom of the ladle, and a form made from 10-gage sheet steel is placed on the bottom lining, centered in the shell. This form is welded up as a closed container with a quick-connect hose coupling on the top and small holes drilled in the bottom. With the form in position, the lining mixture is lightly tamped into place between the ladle shell and the form.

A hose to carry CO_2 then is connected to the form, and the gas is turned on. CO_2 escaping through the bottom holes in the form flows through the bottom lining, then up through the wall lining to escape. A 20 to 30-second gassing cycle hardens the lining. The form then is removed, and the ladle may be fired immediately without danger of cracking, spalling or shrinking.

When this lining is used with high-manganese steel, the skull that is formed can be rapped and lifted out of the ladle after it has cooled. The skull carries with it a coating of sand about one grain in thickness and leaves a clean, uncontaminated surface for the next heat. In this manner, a lining in a handshank ladle is capable of handling about 6 tons of metal.

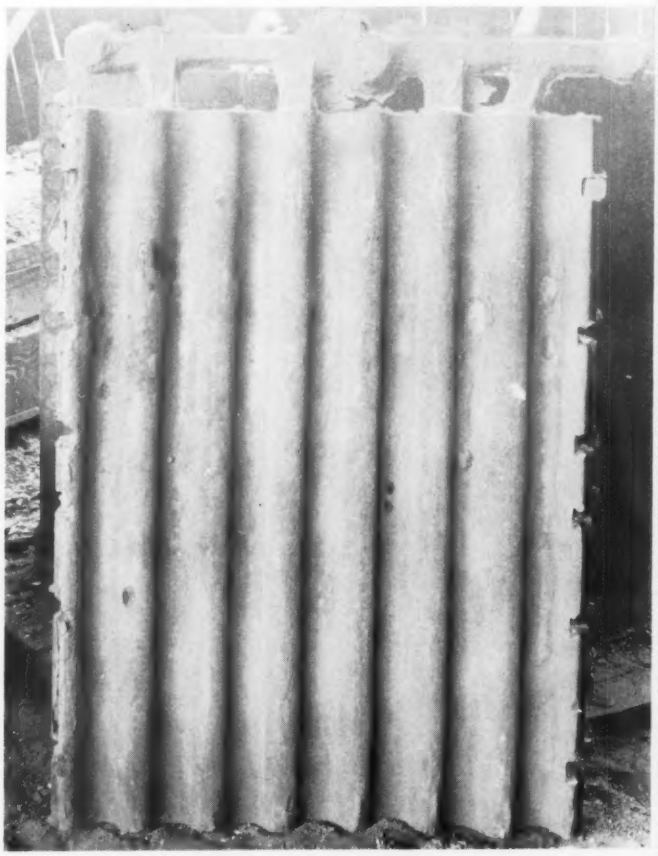


Fig. 5—High-manganese crusher jaw as it came from shakeout. The casting weighs 3100 lb when cleaned. The mold cavity is made with a sweep

Fig. 6—Carbon steel coupling casting produced with the aid of olivine cores in a silica mold

This method of lining also is used successfully to line the spout of a large teapot ladle. In this operation a steel pipe is used for a form. The body of this ladle is lined with a magnesite ramming mix which has been mixed with an equal weight of fine olivine sand. It is claimed that this procedure reduces expansion of the magnesite and results in a superior lining.

System Contamination—Each operating day, an appreciable amount of new olivine sand is put into service at this foundry, and no attempt is made to separate the olivine at shakeout. As a result of this practice, the system sand is comprised of both olivine and silica aggregate. It is significant to note that no ill effects have resulted after many months of this "contamination" procedure. It was pointed out previously that olivine and silica sands are used commonly in direct contact without trouble. It, therefore, seems safe to assume that olivine contamination of a silica sand heap likewise should present no difficulty. Columbia's experience over many months of successful operation with a mixed system sand should be reassuring to other foundries.

Olivine Formation and Formulation—Olivine is a solid solution of magnesium ortho-silicate (forsterite) and iron ortho-silicate (fayalite). Forsterite is the ingredient which lends desirable properties to the mineral for foundry aggregate and should make up 90 per cent or more of the rock. The ratio of forsterite to fayalite can vary, and the properties of olivine vary accordingly. Any discussion of the proper use of olivine molding materials should include an identification of the deposit from which the material was mined or quarried. The olivine described in this paper comes from the Twin Sisters deposit in the Cascade Mountain range of Washington.

Olivine deposits normally include, to some degree, detrimental impurities such as enstatite, amphibolite and serpentine. Some deposits are more favorably endowed by nature than others from the standpoint of purity.

In many instances, impurities occur in such a manner that they can be removed during the mining or quarrying operation. Therefore the care and knowledge employed in these operations can affect the quality of olivine from any given deposit.

Olivine sand is a manufactured aggregate. It is crushed from the massive mineral and is classified mechanically or by air to produce the various grades. The crushing procedure affects the shape of the grains, and a desirable process yields a minimum of plate and sliver-shaped grains. The classifying process should, of course, result in useful grain distribution with a minimum of fines. The quality of olivine sand made from a given rock depends on the experience and integrity of the manufacturer.

The proper formulation of olivine molding materials may vary according to the source of supply and the processes employed in the foundry. A few general statements can, however, be made concerning olivine core and molding mixtures.

Molding Sand—A well shaped olivine grain, 30 mesh or smaller, is not fractured by conventional mixing equipment. Plate and silver-shaped grains break with little pressure, usually during mulling. A well shaped grain may be "smoothed-up" by excessive dry mulling, thus causing slightly more fines in the final mixture than were evident in the screen analysis of the aggregate.

An angular shape contributes to green strength of a molding mixture, but also hinders flowability. Care must be taken not to overbond this sand. Also, angular grains seem to have a greater ability to "hide" excess moisture than round grains. Therefore water additions should not be controlled by the "feel" test.

Core Mixtures—An angular grain has greater surface area than a round grain and requires more core binder. A well shaped olivine grain requires from 10 to 15 per cent more liquid core binder than a round grain of similar size. If a wheel and plow sand muller is used to prepare the mixture, excessive dry mulling should be avoided.

The mixtures listed in Table I are not considered to be optimum formulas by Columbia Steel Castings Co., and it is anticipated that as the foundry gains experience, these mixtures will be modified. They are, however, giving the excellent results described in this paper.

Mixture M-1 is used for green sand molds and is subject to modification by variations in the organic bonding materials. These are specified herein as maximum amounts. It is probable that this mixture will be used for some skin-dried molding in the future.

Mixture M-2 is used as a facing material for heavy manganese castings. This facing is given an olivine wash and skin dried.

Core Mixture C-1 is employed where good finish and accurate dimensions are required, and C-2 is used mainly in problem areas to avoid penetration.

Shell Molded Crankshafts

Replace Forgings in Outboard Motors

By JAMES SUTHERLAND, Link-Belt Co., Chicago
FRANK T. CHESNUT, Ajax Electrothermic Corp., Trenton, N. J.
EDWIN BREMER, *Metallurgical Editor*

DEVOTED only to the production of cast steel crankshafts for outboard motors, the $1 million shell molding foundry of Evinrude Division, Outboard Marine Corp., Milwaukee, is the result of several years of investigation and development. Substitution of cast crankshafts for forgings first was considered in the latter part of 1952. Experimental patterns were developed in 1953, sample castings were secured from local sources, and in 1954 a pilot foundry was established in the firm's plant.

During 16 months of pilot operation it was found that shell molding produced cast crankshafts somewhat lighter in weight which required less machining and possessed better wearing qualities than the forged variety. Additionally, the pilot operation provided information on suitable sand and its preparation as well as on other features of desirable shell molding operation.

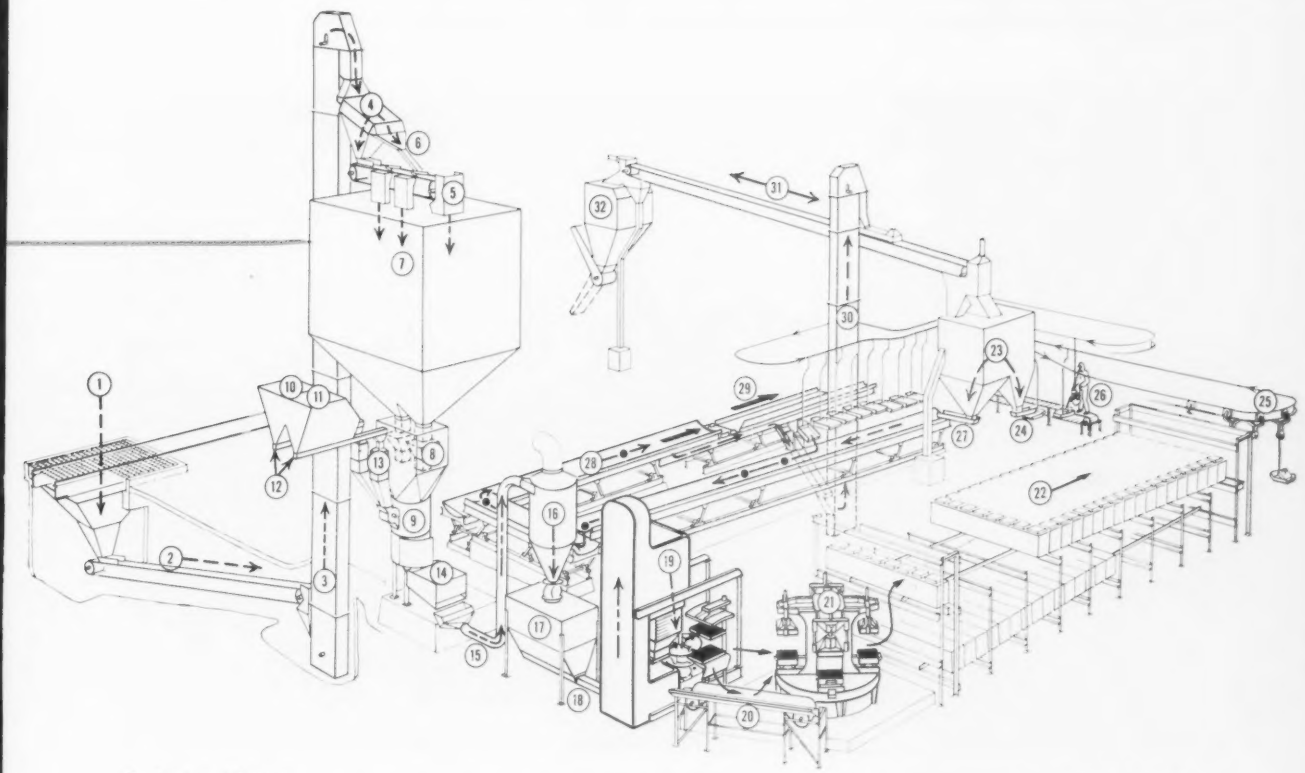
Work on the foundry was begun in the latter part of April, 1956, and the first production heat poured in the early part of November. The foundry was jointly designed by Evinrude and the Link-Belt Co. The latter company also supplied the shell molding and closing machines and conveying and elevating equipment. All melting is accomplished in induction furnaces supplied by Ajax Electrothermic Corp.

Plant arrangement is shown in the perspective view, Fig. 1, with hooding removed to indicate various features designated in the accompanying caption.

Washed and dried silica sand of 55 to 60 AFS fineness is received in covered gondola cars on a railroad siding alongside the foundry and is discharged into a track hopper. Transported on an underground belt, the sand falls into a bucket elevator which lifts it 53 ft and empties it onto a semienclosed vibrating screen for removal of any debris. From the screen, the sand is discharged onto a short conveyor belt which distributes it to either hopper of a two-compartment storage bin. One hopper holds 100 tons and the other 50 tons. The arrangement also provides for handling a two-sand system should that be desired in the future.

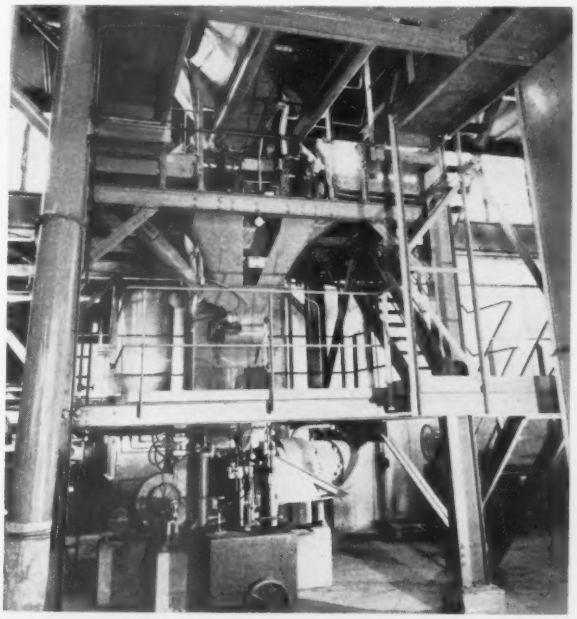
Bottoms of the compartments are equipped with measuring hoppers which discharge predetermined amounts of sand into a totally enclosed sand muller located directly beneath the bins. Sand with an addition of 3 per cent iron oxide is cold coated with 4 per cent resin. Resin and iron oxide in elevated hoppers adjacent to the bins are transported by screw conveyors to automatic scales and discharged into the muller by a rotary vane feeder.

After a brief dry mixing period, approximately 1 per cent of a 3 alcohol-1 water solution is added to liquefy the resin so that it will coat the sand. The alcohol solution is mixed outside the foundry and brought inside in a wheeled safety storage tank of 1-barrel capacity. The proper amount of solvent is transferred from the vehicle into a holding tank by an air-driven pump, then discharged into the muller. A six-timer cycle control unit permits a single or continuous automatic repeating



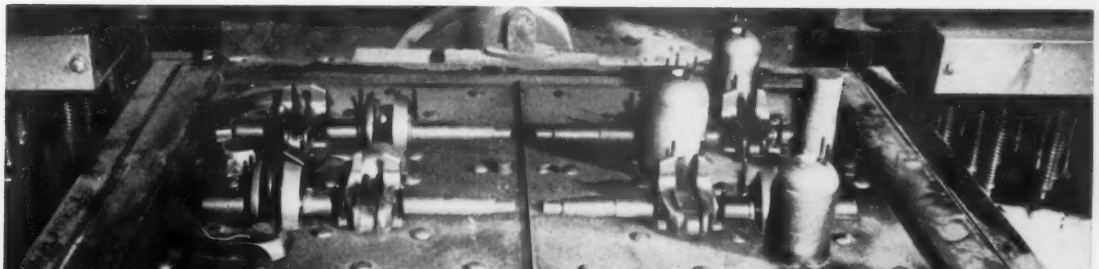
1—Sand track hopper
2—Belt conveyor
3—Bucket Elevator
4—Vibrating screen
5—Distributing belt
6—Refuse chute
7—Two-compartment bin
8—Measuring hoppers
9—Muller
10—Resin hopper
11—Iron oxide hopper
12—Screw feeders
13—Automatic scales
14—Vibrating screen
15—Pneumatic conveyor
16—Cyclone separator
17—Surge bin
18—Screw feeder
19—Shell molding unit
20—Core setting belt
21—Shell closing unit
22—Mold storage rack
23—Backing sand bin
24—Vibrating feeder
25—Mold conveyor
26—Pouring platform
27—Vibrating feeder
28—Oscillating conveyor
29—Sorting conveyor
30—Refuse elevator
31—Belt conveyor
32—Refuse bin

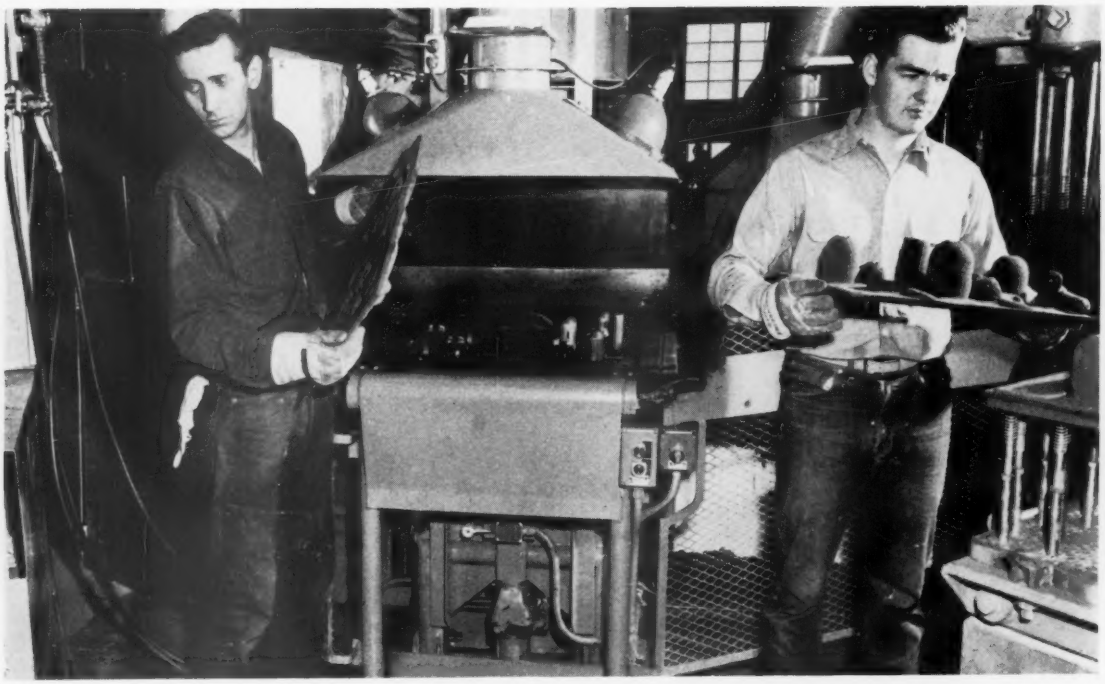
A perspective view showing the arrangement of equipment for shell molding of outboard motor crankshafts. Equipment designations are listed in accompanying table



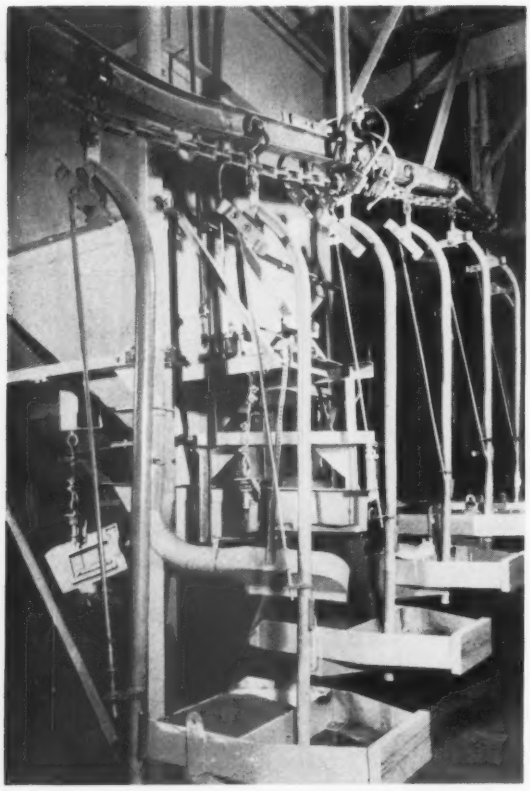
Equipment for preparation of resin-coated sand includes elevated sand, resin and iron oxide hoppers. The alcohol-water solvent is contained in the wheeled tank in the center

In production of crankshaft molds, a single pattern produces both cope and drag at the same time. The shell molding unit contains four patterns which rotate clockwise on the table and index automatically





At the ejector station, mold halves are removed from the machine and placed in the closing unit



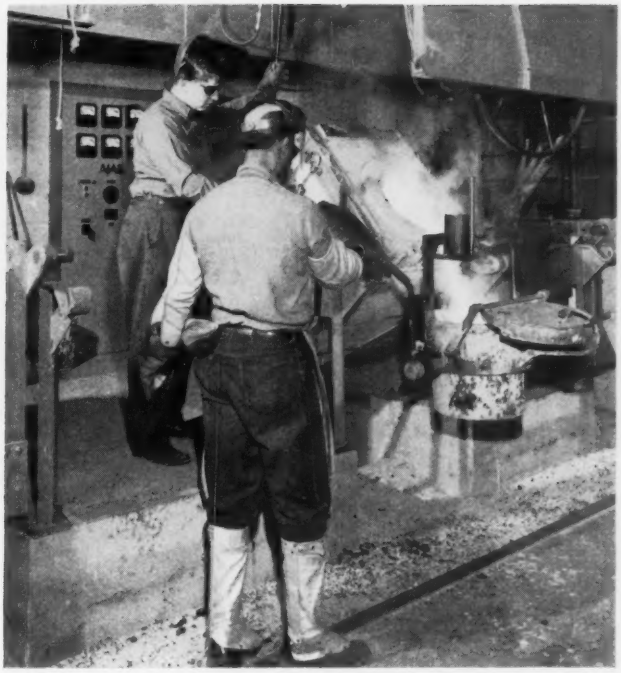
Thin layer of backing sand is vibrated onto the mold conveying pallets automatically when they pass this hopper. Control is by limit switches

cycle. Coating capacity of the unit under automatic control is about 2500 lb per hour.

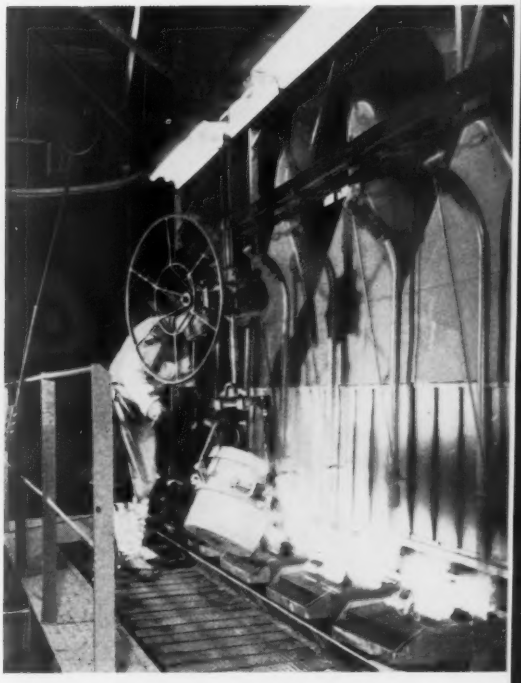
Sand from the muller is discharged onto a vibrating screen to break up any lumped particles and thence into a pneumatic conveyor system which carries it to a surge hopper above a four-station turntable type shell molding machine. Each station contains an electrically heated combination cope and drag pattern which forms a shell 19½ x 29½ in. This is broken in half to form a single shell mold 14¾ x 19½ in.

In operation, the combination pattern automatically is indexed under the investment station and a water-jacketed flask is lowered onto it. A movable bellows attached to the sand hopper moves down to the top of the flask to eliminate any dusting during the filling operation. A measured amount of the resin-coated sand falls into the flask, and after a predetermined time required to develop the desired shell thickness, the bellows connection to the hopper is raised. Flask and pattern roll over to discharge excess, unhardened sand, then roll back again. The flask is raised from the pattern and shell, which move to two successive stations where the shell is cured to the desired hardness under electric heaters.

At the fourth, or ejector station, the finished shell is stripped automatically from the pattern, and the halves are broken apart by the operators. The drag-half shell is placed on a short belt adjacent to the machine for setting of small cylindrical lightening cores in the center of the connecting rod bearing sections, then transferred to one of the stations on a four-station automatically operated closing machine. A small amount of dry resin is vibrated through a perforated plate on specific areas of the drag, the cope is set in position, and the halves are bonded together by re-



Steel from the high-frequency electric furnaces is transferred into small ladles for pouring



Operator on platform moving synchronously with mold travel fills molds with molten metal

sidual heat. Spring loaded rods supply pressure.

Assembled shells removed from the closing machine are placed on cars on a storage rack. That unit contains three tiers of track for gravity movement of the mold cars. The upper two tracks slope down, away from the molding area to the pouring area. The lower tracks slope down from the pouring area to the molding area, to carry the empty cars back. Each of the upper racks holds 26 cars on each of which 16 molds, placed sprue opening down, can be carried. Raising and lowering the cars to the various tiers at both ends of the storage rack is accomplished with elevators.

Molds are taken from the storage cars and placed on carrier trays on the pouring conveyor. That conveyor is an overhead trolley type 152 ft long, arranged as an L-shaped loop with legs about 30 and 40 ft long. The conveyor carries 57 hinged trays, 20 x 24 in. on 32-in. centers. Previous to placement of molds in the trays, the latter are filled with a layer of backing sand to support the molds. This sand is supplied automatically from a 20-ton storage bin by a vibratory feeder operated by limit switches.

Melting is accomplished in high-frequency induction furnaces. The installation is composed of one 175-kw unit with two 350-lb capacity furnaces and two 300-kw units, each with two 700-lb capacity furnaces. Furnaces are arranged in pairs, each pair having separate power generating equipment. Only one furnace in each pair is in operation at any time; the other is in standby condition or, if necessary, is being repaired or relined. With three furnaces in operation, the melting rate is 1 ton an hour.

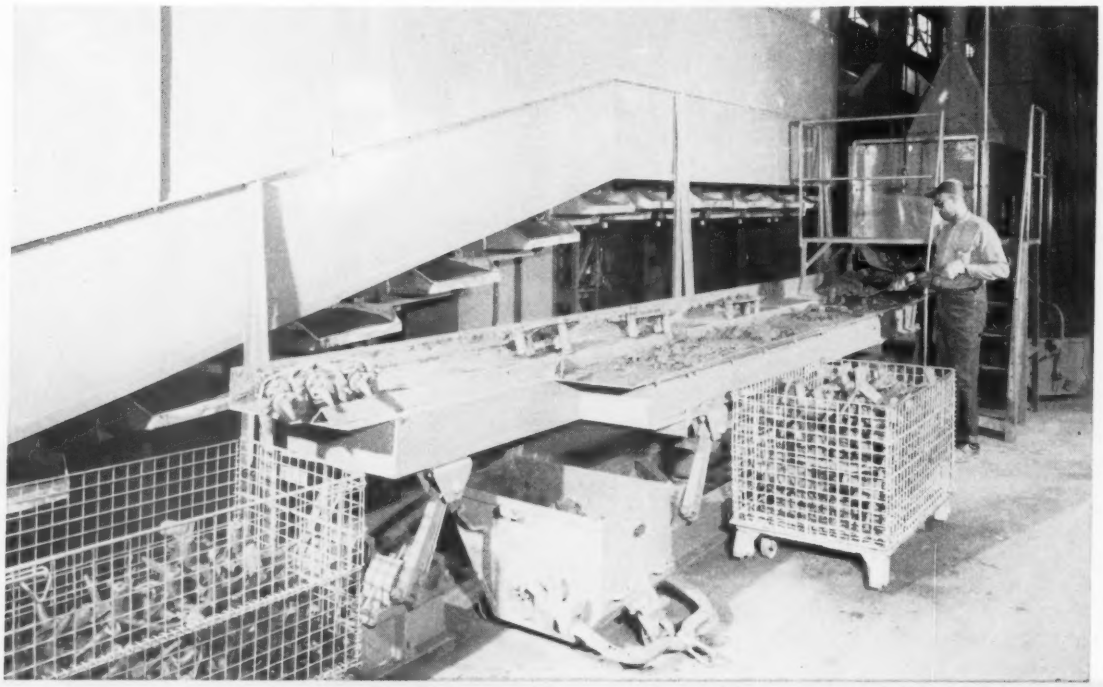
Melting is performed on a temperature-time cycle. The metal temperature is taken with an optical pyrometer on meltdown and is checked at intervals. When the temperature reaches 2950°F, the time is noted and the power input adjusted to a level which experience has shown will bring the heat to the tapping temperature of 3150°F in four minutes. Three minutes before tapping time, an addition of ferrosilicon is made, followed in one minute by an addition of ferromanganese. One minute later, the heat is tapped. Melting cycles on the furnaces are staggered so that a constant supply of molten metal is available.

Molds on the trays are conveyed on one leg of the loop, past the pouring station where an operator standing on a moving platform traveling at the same speed as the mold conveyor fills them with molten steel. Poured molds are carried around the other leg of the loop to either of two preselected shakeout stations. There, they are dumped automatically onto an oscillating conveyor containing a layer of backing sand discharged from the previously mentioned storage bin by a second vibratory feeder. This conveyor, one of three arranged in a U-shape, is 53 ft long and dumps castings and sand onto a 16-ft, oscillating cross conveyor. In turn, that conveyor discharges the materials onto another oscillating conveyor, 60 ft long, which carries castings and sand in a direction opposite to the first, or 53-ft, conveyor.

An 8-ft screening section is located about 20 ft from the end of this conveyor. The $\frac{3}{8}$-in. openings in the screen section permit backing sand and part of the mold and core sand to drop to the lower trough of the conveyor. Those sands are

mold conveying pallets automatically when they pass this hopper. Control is by limit switches

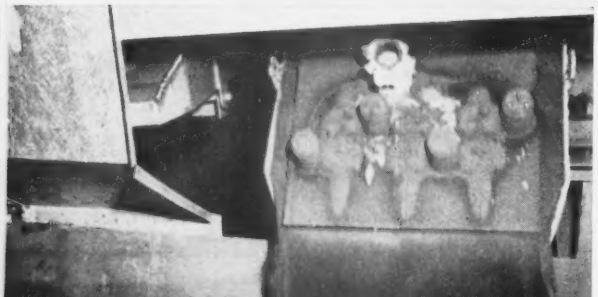
sition, and the halves are bonded together by re-



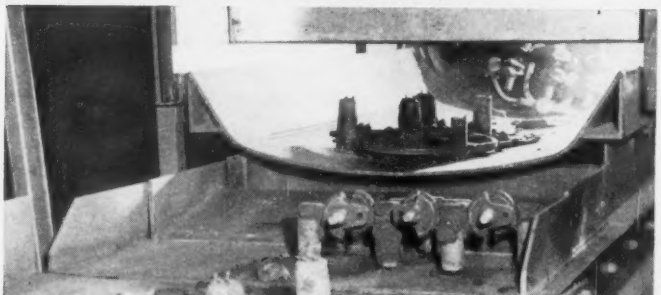
End of conveyor is divided, and operator flips castings over the divider to be carried to a basket. Pieces of molds and cores fall into container

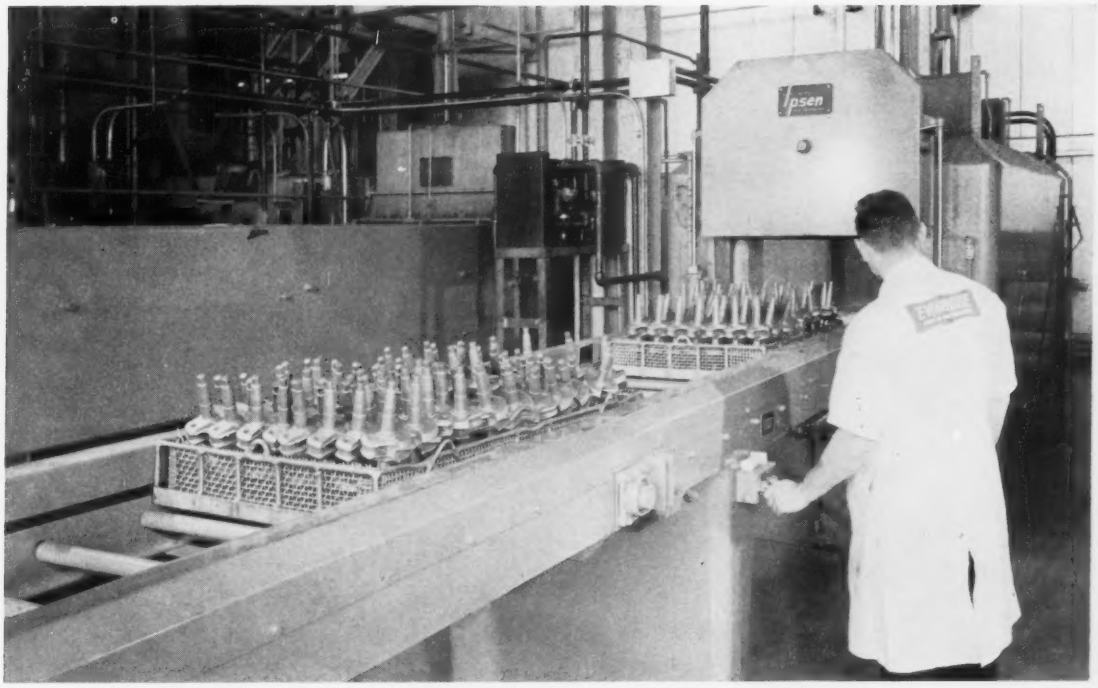
The men responsible for the new shell molding foundry at Evinrude Motors include, from left to right, W. J. Webb, vice president and division manager; C. E. Kopp, factory manager; J. G. Rayniak, president, Outboard Marine Corp.; and Ralph Evinrude, vice chairman of the board, Outboard Marine Corp.

Molds on trays are dumped automatically onto an oscillating conveyor on which the castings cool



Screening section near the end of the conveyor permits backing sand to fall on trough below





After cleaning and separation from gating system, the crankshafts are placed in baskets and subjected to normalizing and drawing operations

discharged into the boot of a bucket elevator which elevates them to a reversible conveyor belt. The conveyor belt carries the sand to the 20-ton storage bin feeding backing sand either to the mold trays and to the oscillating conveyor, or to a refuse sand hopper.

Castings, gating systems and larger pieces of molds and cores move along on the remaining section of the oscillating conveyor, which is divided and serves as a picking table. Material travels down one channel, and an operator flips the castings and gates over the divider into the other channel, which discharges them into wire baskets. Pieces of molds and cores in the first channel fall off the end of the conveyor into a tote box for disposal.

Risers and runners are removed from castings on a high-speed, friction-cutting band saw. Castings are shot blasted and loaded into alloy trays for heat treatment, which consists of normalizing and drawing operations. Normalizing is performed in an automatically operated, combination pusher and chain conveyor furnace divided into four zones. The furnace atmosphere is endothermic. A load of 600 lb of castings in a tray is pushed into the first or preheating zone, where it is heated to 1750°F in an hour. Then it is pushed into the second or holding zone, where it is held for one hour. At the end of that time the tray is moved into the first of two cooling zones, where it remains for an hour while the temperature drops to about 800°F. Then the chain conveyor mechanism transports the tray into the second cooling zone. The tray of castings remains in this zone for an hour, and during that time the temperature drops to 500 to 600°F.

The tray then is moved out of the normalizing furnace onto a semiautomatic roller transfer into the drawing furnace, which is located across a 6-ft aisle and parallel to the normalizing furnace. That furnace, similar in construction to the normalizing furnace, employs an exothermic atmosphere. Castings are heated to 1150°F, held at that temperature for one hour, then cooled to handling temperature in an hour. After the drawing operation, the gates are removed on a semi-automatic, abrasive wheel cut-off machine, shot-blasted, placed in tote boxes and transported to the furnace area for melting. Castings are sent to the machine shop.

As may be observed in the various illustrations, all equipment is enclosed by hooding where dust is generated, and the dust is exhausted into three dry and two wet-type dust collectors. These, in combination with a number of ventilating fans located in the roof of the foundry, change the air every three minutes.

Although the foundry uses many conveyors and automatic devices, it is interesting to note that at no point can a "pile-up" occur. There is sufficient flexibility so that if anything goes wrong, that part can be shut down quickly (or started up) with negligible spoilage and without interfering with the effective operation of other parts of the work. Coated sand, for instance, does not deteriorate if not used as it is prepared. The mold storage racks afford considerable flexibility at that point, and the furnace installation assures a continuous supply of metal under all conditions.

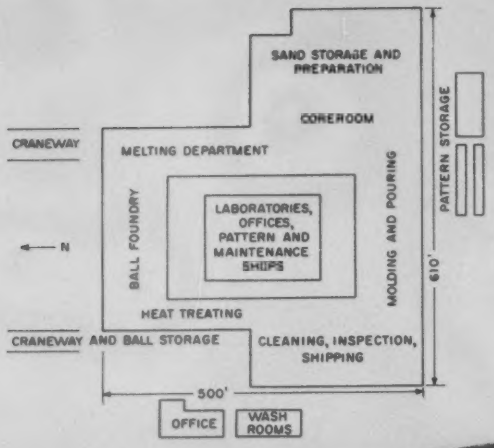


Fig. 1—Layout of the foundry, showing location of the principal departments. Floor space provided is 208,000 sq ft.

Aerial view shows how the foundry is built around enclosed service building

Arizona's Largest Foundry

Is one of the Country's Most Modern

New foundry of National Malleable's Capitol Foundry Division is equipped to produce a wide variety of plain and alloyed iron and steel castings. All melting is done in electric furnaces

By **WILLIAM G. GUDE**
Managing Editor

tray of castings remains in this zone for an hour, a continuous supply of metal under all conditions.

ARIZONA has been best known for many years for the attractiveness of its scenery and climate. Recently, however, the state also has been able to boast of a growing industrial development. Outstanding among the new plants built there is one of the country's most modern foundries—the iron and steel casting facilities of the Capitol Foundry Division, National Malleable & Steel Castings Co. The plant is located near Tempe, a few miles east of Phoenix.

The original Capitol Foundry Co. at one time operated two foundries in Phoenix—one a gray iron foundry, which also manufactured white iron grinding balls, and the other a small steel foundry known as the Arizona Iron Works. About five years ago Capitol was acquired by National Malleable, and a site was selected outside the city for a new plant. With the construction of the new and larger capacity, operations in Phoenix were discontinued.

The new foundry, which started production a little more than three years ago, occupies about 208,000 sq ft of floor space. It is situated on 86 acres which provide ample room for future expansion. Employment totals about 340.

Operations Are Versatile—This foundry is unusual in several respects—aside from the fact that it is a relatively large plant in a state which can number only a handful of small foundries:

(1)—It is both a production foundry and a job shop, and is capable of producing a wide variety of both plain and alloyed iron and steel castings. Output is divided evenly between iron and steel, the types of metal produced including gray iron, a number of different analyses of white iron, Ni-Hard, alloy gray irons, and various types of carbon and alloy steels.

(2)—All melting is done in electric furnaces.

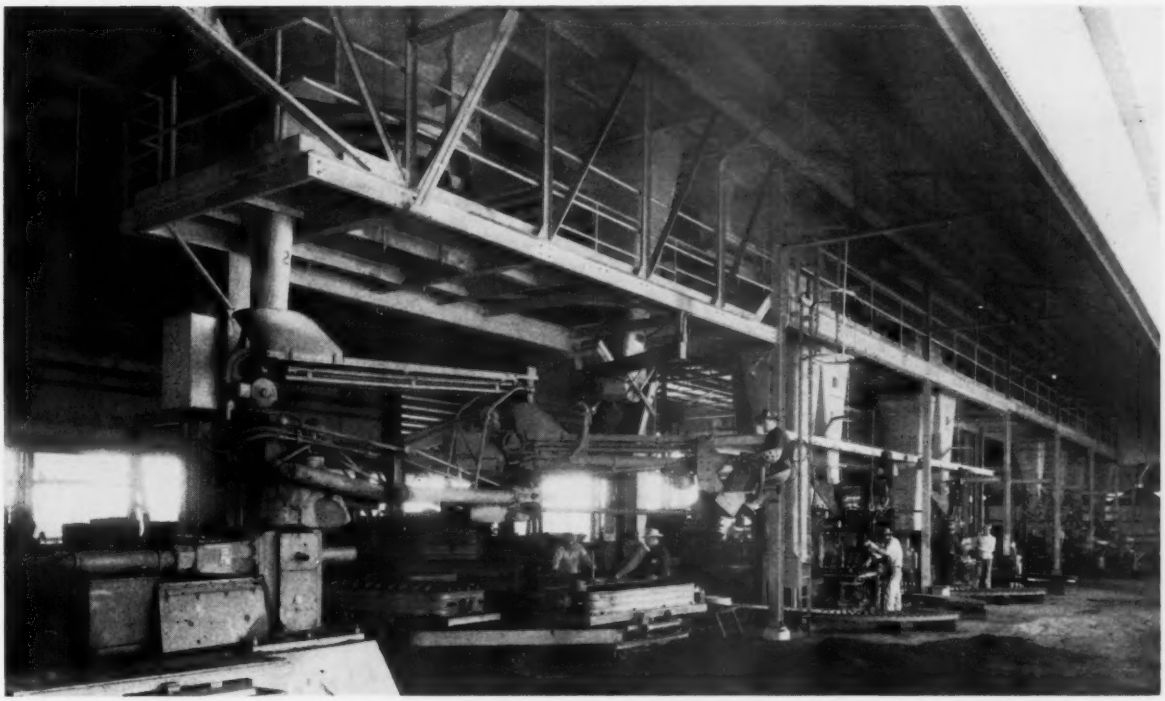
(3)—From the standpoint of building design, the plant differs markedly from conventional foundry architecture.

Principal high-production item of the foundry is cast steel grinding balls. Other castings are miscellaneous products—principally machinery repair parts which are made in a wide range of sizes, shapes and composition. Many of the miscellaneous steel castings are for heavy machinery and involve abrasion-resistance applications. Liners for ball mills comprise an important share of this type of casting; they are chrome-molybdenum composition.

Other products include dipper teeth, gears, pump castings, etc. Maximum size of casting produced generally is about 5000 lb, although larger parts can be poured. Output is approximately 10,000 tons annually of miscellaneous castings and an even larger tonnage of cast balls.

Walls Are Curtain Type—The foundry building is roughly T-shaped. One of its striking features is the use of small curtain walls, a design which takes advantage of the region's mild climate and helps to promote good ventilation. An open area—or quadrangle—in about the center of the plant, as may be seen in Fig. 1, provides space for a totally enclosed service building measuring 137 x 184 ft. This building houses laboratories, storeroom, toolroom, foundry offices, and pattern and

Fig. 2—Molding department for miscellaneous castings. Situated along one side of the building, this open area has a canopy overhead, no side wall



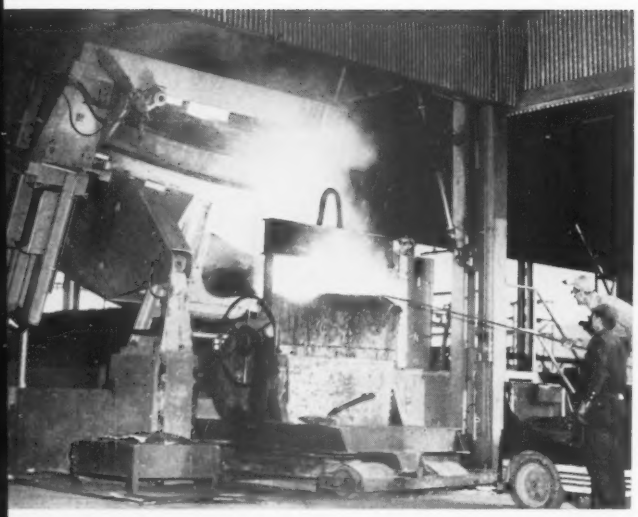


Fig. 3—Tapping one of five electric furnaces. Special carrier is used to haul ladle to molds

Fig. 4—Recording spectrometer speeds analysis of the many different composition metals melted

Fig. 5—General view of the cleaning department

maintenance shops. Its location makes it conveniently available from all sections of the plant.

As indicated in the accompanying sketch of the plant layout, the ball foundry occupies the north side of the building. Melting and coremaking departments are on the east side. Miscellaneous castings production is carried on in the south area, and the annealing and cleaning departments are on the west side of the plant.

Three bins for storage of about 1600 tons of sand are situated alongside a railroad siding which extends past the east side of the plant. The storage area adjoins the sand preparation plant. Separate sand preparation facilities are provided for the ball foundry and for miscellaneous castings work.

Miscellaneous Castings—Molding operations in the miscellaneous castings foundry are handled efficiently by a variety of equipment; in addition, some floor molding is done. A sandslinger, operating in conjunction with a turntable and a rollover machine, rams molds for the larger castings. These molds are set out on roller conveyors for pouring, as also are molds produced on a pair of cope and drag jolt-squeeze units. A pallet line is fed by three squeezer machines. Sand for all of these units is obtained from overhead hoppers supplied by belt conveyor from the central sand preparation unit.

All of the above-mentioned molding equipment is aligned on the inner side of the miscellaneous castings foundry, as shown in Fig. 2. It will be noted that although a canopy extends over the top of this molding area, there is no side enclosure —not even the curtain walls used for the building exterior.

Patterns are stored outside the foundry proper in a quonset type building and in 33 concrete vaults immediately south of the plant.

Molds are poured from ladles handled either by one of several cranes or, in the case of the pallet line molds, from ladles suspended from a trolley rail. Small molds after pouring are moved

by a car conveyor to a mechanical shakeout, and larger castings are placed on a conveyor line, consisting of 4 x 7 ft cars, for cooling and removal of gates and risers. The castings then are moved by crane to the cleaning and annealing departments. The cleaning room is equipped with six swing frame grinder stations and stand grinders in addition to two shot blast rooms and a rotary table blast unit. An airless blast barrel is provided for smaller work.

Hot metal is supplied by five electric arc furnaces. Provision is made for addition of a sixth furnace. Existing units include three of 10 tons charge capacity, one rated at 3 tons per hour and one at 1½ tons per hour. A craneway extending from the end of the melting department spans the raw material storage area. The furnaces are tapped into ladles placed on a special carrier, as shown in Fig. 3. Carrier and ladle are hauled by truck over a 30-ft-wide gangway to molds for either direct pouring or for transfer of the metal to pouring ladles.

Because of the numerous different analyses of metal in which castings are made, the foundry finds it important to speed analytical work on melts as much as possible. An important assist in the laboratory work is provided by a recently installed recording spectrometer (Fig. 4). It enables the metallurgist to obtain a check on metal composition in a fraction of the time required by conventional chemical procedure.

Ball Foundry—Steel balls are cast in six sizes ranging from 1½ to 4 in. in diameter. Widely used in the mining industry for crushing ores in mills, these balls must be made under closely controlled conditions to provide the desired metal analysis and grain structure. They must be sufficiently hard to give maximum wear and sufficiently tough to resist fracture in service.

The ball foundry has its separate sand preparation plant and also is equipped with a dry type sand reclamation unit. Patents are pending on the operation employed in the ball foundry. Mold halves are blown by machine, baked in a vertical oven, and assembled on a revolving wheel for pouring. After solidification, the balls are broken out of the molds, tumbled, washed and then heat treated. The continuous furnace shown in Fig. 8 is used for hardening the balls, although batch type equipment is available for heat treatment of both balls and miscellaneous castings.

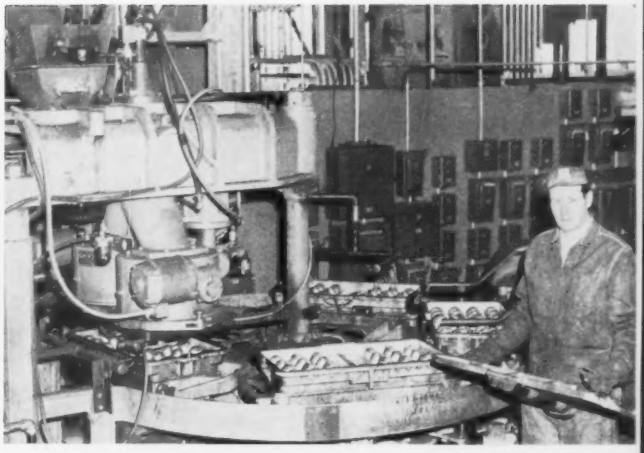


Fig. 6—Machine used to blow molds for casting steel balls. The molds are baked before pouring

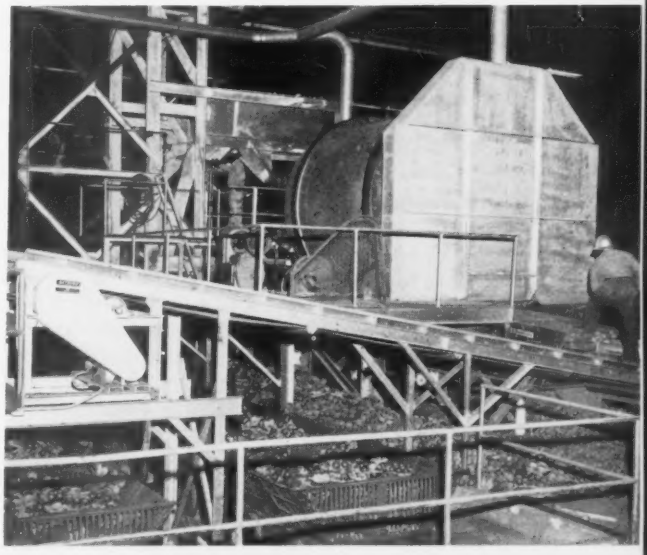
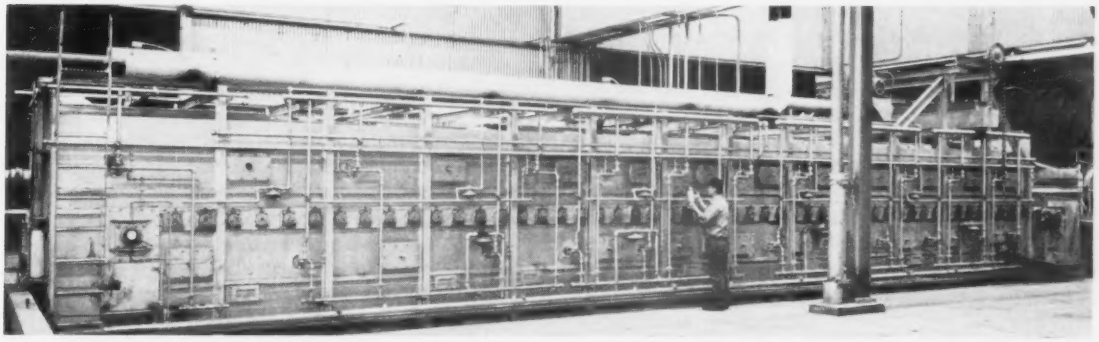


Fig. 7—Tumbling mill used to clean cast balls after they have been broken out of the molds

Fig. 8—This continuous furnace is one of several units employed in heat treating castings



Testing Procedures In The Brass Foundry

In article No. 26 in his series on *The Brass Foundry*, Mr. St. John turns to testing procedures and their importance in quality casting

THE successful operation of a modern foundry involves a measure of technical control unknown to the foundryman of half century ago. A great variety of testing procedures now is available to supplement human skill and experience, which, no less necessary than in the past, are no longer sufficient.

Control of molding sand, purchased metal, melting and pouring practices and other details of foundry work have been discussed in previous articles. It is our purpose now, without attempting to repeat these, to cover some of the things the foundryman can do from day to day to learn what progress he is making in maintaining the quality of his product. If trouble can be discovered promptly, methods already described can be used to correct it.

First, let us consider molten metal as it comes from the furnace. In the steel foundry it is common practice to hold a heat of metal while tests are made by spectroscope or other rapid methods. If anything is found amiss, it then is possible to correct the melt in the furnace, before castings are poured. In a production brass foundry, one cannot afford the time to do this.

For very large castings, when possibly only one or two a day are poured, such a delay might seem worthwhile; but even here there is an objection to holding the metal in the furnace after it is ready to pour.

The copper-base alloys are much more likely than steel to suffer damage as a result of being held in a superheated condition. What we *can* hope to do is to discover a substandard condition of the metal within an hour or two after it has developed and in this way avoid making any considerable number of substandard castings.

Early discovery of metal trouble is particularly important with respect to defects which do not become apparent until after machining. Castings sometimes are not machined until days, or sometimes weeks, after they have been made. Meanwhile trouble may continue undetected and many defective castings be made.

One quick test can be used if there is reason to suspect that the metal is gassed. A small, open-top mold with a cavity about the size and shape of a sprue is filled with molten metal from the doubtful heat. If this metal shrinks in a normal manner, well and good. If it starts to shrink and then puffs up at the center, the heat should not be poured into castings until it has been degassed by flushing with dry nitrogen gas or by other effective means. Otherwise it would be better to pig the heat and start over again.

The test bar is a time-honored method for determining the quality of metal. It is a useful method provided one remembers that the properties shown by a test bar are a measure only of the quality of molten metal in the ladle, not necessarily a measure of the casting's quality. Some specifications have provided that when a large casting is to be made, the test bar should be attached to the casting and thus poured at the same time.

However effective this step may be with iron or steel, it is useless with brass or bronze. For example, if the metal is poured too hot, one may find a good test bar attached to a worthless casting. Again, if the pouring temperature is right for the casting, it may be quite wrong for the test bar.

Foundry literature contains much information regarding nonferrous test bars and the interpretation of their properties. Their use is standard in the acceptance or rejection of castings made to Federal, ASTM or SAE specifications. Such castings make up, however but a small percentage of over-all brass foundry production. We are concerned here, not so much with specification test bars, but with the use of test bars for the foundry's own information in controlling the quality of its product. For this purpose we can design the test bar pattern to suit ourselves, unhampered by regulations which usually state just how the test bar is to be made.

Fig. 1 shows the pattern arrangement which in the writer's opinion is most suitable for the red brasses and bronzes and which has, as a matter of fact, been found acceptable for specification

By HARRY ST. JOHN
Foundry Consultant

work. Less acceptable for such an alloy as manganese bronze, it still serves the purpose so far as the foundry's own information is concerned. For this and other high-shrinkage alloys, the gates must be somewhat enlarged.

Twin test bars are indicated by T and T. S is the sprue and R a massive rectangular riser. This layout is designed to give the highest possible physical properties; and results obtained should be considerably above the minimum figures named in standard specifications. These, it must be understood, are never typical of what should be expected from good practice, but simply name the lowest figures which can be considered tolerable.

Since the average brass foundry does not have facilities for pulling test bars, bars usually must be sent to a commercial laboratory with a delay of a couple of days or more before results are known. As a check on other tests, test bar figures are useful, and every foundry should follow the practice of making and testing them at regular intervals. The physical properties of metal determined in this way have the added advantage that they form part of a universal language and can be compared directly with specifications and other published figures.

Test bars should be as carefully made as any other casting. With the arrangement shown in the diagram, highest physical properties for alloys in the 85-5-5-5 class will be obtained at a pouring temperature of about 2150°F. If the metal is of high quality, the physical properties should be reasonably good over a range of 100 degrees or more, say from 2200°F to 2100°F.

For day-to-day control, we need more prompt information than we can get readily from test bars. One of the quickest and best methods is by examination of fractures. Extensive work has been published by the Research Committee of the Nonferrous Division of the American Foundrymen's Society which has attempted to put fracture evaluation on a scientific basis. If this step could be achieved, the results in any foundry could be compared with published standards, and we would have a quality control tool as definite as the test bar and much more rapid in its application. Although much valuable information has been gained, the use of the proposed method so far has been only moderately successful. For one thing, in the writer's opinion, too much emphasis has been placed on minute gas porosity and not enough on the quality of structure which results from undercooling at the time of solidification. Perhaps we cannot hope to measure this. Actually the interpretation of a fracture defies description, depending, as it does, on an appraisal of metal color and texture which only experienced judgment can supply.

One type of fracture deserves at least an attempt at description. Every foundryman is familiar with localized shrinkage cavities which are due to insufficient feed at a heavy section. He tries to correct these by increasing the pouring temperature or by a change in the gating.

Less well understood is what may be called "hot shrinkage," a type of fracture characterized by large dendritic crystals tarnished to a color which varies from yellow through orange to brown or even black. In extreme cases, there is complete

separation through the center of the section. This is due to an excessively long period of solidification, permitting the oversize growth of a few crystals which eventually shrink away from each other.

In such an instance, the pouring temperature may be too high, or the casting design may be at fault. A gating change may help, or the trouble may be due primarily to a scarcity of crystal nuclei or lack of undercooling. Minute quantities of aluminum or silicon also may be responsible.

The addition of an undercooling agent such as nickel will help to correct the difficulty. Diagnosis of such a condition and the choice of a remedy require a high degree of metallurgical skill plus foundry knowhow.

Fracture tests may be made on castings or on specially prepared test pieces. The latter usually are rectangular in shape, at least ¾ inch thick and, say 5 x 3 inches long and wide, although exactness in these dimensions is not important. Test pieces should be gated and risered in such a way as to avoid external shrinkage depressions. The pouring temperature should be determined by trial to yield the best possible fracture for the alloy in question. Fracture of castings should be a matter of daily habit, and castings which are likely to be critical should be selected for the purpose.

Testing for Hardness

Among hardness tests sometimes employed, the Brinell test is most suitable for use in the brass foundry. The Rockwell test, widely used in other fields, does not work well for brass castings because its testing area is small and likely to strike an unusually hard or unusually soft spot.

In the Brinell test, the indentation is of substantial size, and hardness of the metal is calculated from the diameter of the indentation as measured under a calibrated magnifying glass. Details as to the manner of its use are readily obtainable from the manufacturers of Brinell equipment. The test piece already described is suitable for Brinell testing.

The writer has found the test to be sensitive in measuring the low quality of off heats as well as the gradual deterioration in quality which sometimes takes place when slightly substandard metal is used day after day. It is practically necessary for the foundry to set its own standards as a result of experience, bearing in mind that excessively high readings are as sure a sign of trouble as low readings.

Fluidity of metal in the molten state is a matter of great concern to the foundryman and a quality not easily measured. Tests devised for the purpose require a nicety of technical control not suitable for ordinary foundry use, although in well equipped laboratories they have yielded some useful basic information.

Possibly the best method for the foundry is to select a casting of thin section, which experience has shown is very liable to misruns, and to pour samples of this casting from small test heats. A previous article on foundry layout stated the desirability of including in the layout a test room including small scale melting and casting equipment. Sample castings or test bars made in such a test room from incoming lots of ingot often give more valuable information than can be obtained from chemical analyses.

Ingotmakers supply certified chemical analyses with each lot of ingot. These should include iron, nickel and sulphur and for the red brasses and bronzes should state that silicon and aluminum are absent. The other impurities mentioned should be watched closely since wide variations affect the fluidity of the metal.

Samples for chemical analysis should be taken frequently from the foundry's own melt to make sure that it does not deviate too much from the prescribed analysis. Small variations in the principal elements, such as copper and zinc, are of little consequence, but wide variations influence

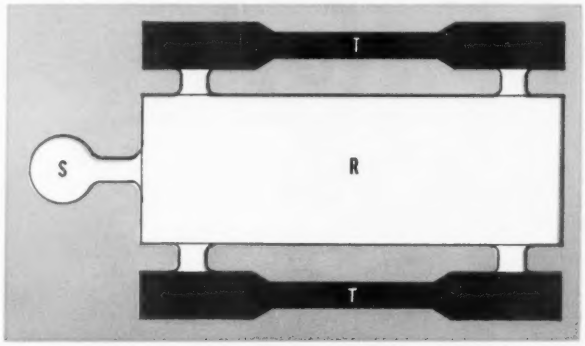


Fig. 1—Pattern arrangement for red brass and bronze test bars for the foundry's information

pouring temperature and may also unduly increase the per pound value of castings delivered to the customer.

For the ingotmaker, the spectroscope is an almost essential analytical tool. It enables him to measure and control impurities in his large reverberatory heats while the metal is still in the furnace. The equipment ordinarily is not necessary in the average brass foundry.

On occasion it is both interesting and worthwhile to check a fracture test finding by a test which permits definite measurement. One such is the specific gravity test. If a test piece is first weighed in air, then weighed while immersed in water, the weight in air divided by the difference in the two weights will give the specific gravity of the test piece. Or the volume of water displaced may be measured and divided into the air weight of the test piece. Weights should be measured in grams, volume in cubic centimeters.

If the figure obtained is low, it is evidence of open structure, due either to gas porosity or to dendritic crystallization. For the red metals, a specific gravity of 8.9 is practically perfect, whereas 8.6 or less indicates undesirable porosity. A specific gravity as low as 8.2 has been observed. For other alloys the figures differ slightly.

Machinability, or ease of cutting, is a property not directly related to any of the other properties we have mentioned. No standards for its measurement have been developed, and it need not be considered as a routine test. There may be times, however, when it is desired to learn the effect of a change in practice or a change in composition, perhaps to satisfy a machine shop complaint. The following procedure is suggested.

Set up a drill press to operate with a weighted ¼-in. drill under a 10-lb weight. Sharpen the drill to a measured pitch and lead. Drill a series of ten holes in a test piece made under standard conditions. Time each hole with a stop watch. Resharpen the drill, and drill another series of ten holes in the piece to be tested. Divide the total time required to drill the ten test holes by the time required for the ten standard holes, thus obtaining a percentage relationship between the two. The test can be varied by drilling the standard holes and test holes alternately. The results of such a test are interesting and sometimes valuable.

Radiography Shows Defects

In some instances, hidden defects which do not appear even after machining or pressure tests may cause failure of the casting in service. These may be detected by radiographic tests, which in effect enable one to examine the casting as though it were transparent. Such tests are most useful in the examination of very large castings.

Commonly, pictures are taken which may be examined at leisure and kept as a matter of record. Copper-base alloys do not lend themselves to this procedure as well as the ferrous alloys and light metals. The pictures of brass and bronze are less distinct and consequently more difficult to interpret. The method is not wholly without merit, however, and sometimes may be used to advantage.

Even with small castings, it is possible in this way to determine, by the examination of a series of castings, whether a defect such as an internal shrink actually has been eliminated by a change in gating or pouring temperature. The method has of course the advantage of being nondestructive.

Another type of nondestructive testing has more common application. Sometimes one encounters defects which, although they occur at the surface of the casting, are so minute as to be practically invisible, even though they reach deep into the casting. Some cold shuts fall into this category. These may be detected by coating the casting with a fluid having fluorescent properties and, at the same time, so little surface tension that it will penetrate into the smallest opening.

After time has been allowed for penetration, the casting is washed and inspected under ultraviolet light. The defect then becomes clearly visible to the naked eye. This test can be used for 100 per cent inspection or on a sample of castings to determine the effectiveness of corrective measures taken after the prevalence of the defect was discovered.

Finally we come to this matter of 100 per cent inspection. Let us agree that complete final inspection and testing should be practiced before castings reach the ultimate consumer. Failures in service are costly to the reputation of the maker. But at various steps along the line of manufacture, complete inspection may or may not be economical, depending on the number and character of defects found.

For example, if 100 per cent inspection of rough castings before machining costs more than it costs to machine the few defective castings found, such inspection is wasted money. Furthermore, in a program to reduce the percentage of defective castings, how are we to know when we have reached a point where further effort along this line will cost more than it is worth?

The answer to these questions has been sought mathematically and involves more calculus than anyone not a mathematician can be expected to understand. The principles concerned are not too difficult, however, and are worthy of consideration. They have been described in a volume entitled *Statistical Quality Control for Foundries*, published by the American Foundrymen's Society in 1953. Without attempting to delve too deeply into the subject let us see what these principles are.

Any manufacturing operation has a certain "process potential" or "capability." Within the limits of this capability, variations in the product take place which, depending on the tolerances allowed, will result in some defective pieces. These are said to be due to "chance causes," and it is a waste of time to try to eliminate them unless we propose to improve the process potential by a change of equipment or method.

Defective parts which occur in excess of the chance causes are said to be due to "assignable causes," which means that the causes can be identified and corrected. These we can work on with profit, and our procedure should be such that we can detect the presence of assignable causes the moment they appear.

Keep Defectives to a Minimum

Men, machines, metal and sand being what they are, we always are going to make some defective castings. Our problem is to keep defectives at a minimum and, first of all, to know what that minimum is so that we can gage our efforts accordingly. It now is possible, following the principles of statistical quality control, to analyze any foundry operation so that we can learn its potential.

We then can discover how many defective castings are inevitable within that potential. We also can learn how to detect assignable causes, which of them can be corrected and what proportion of our castings must be tested or inspected in order to accomplish our end without spending too much time and energy doing it.

If we take steps to improve the process potential, we can learn at once how much we have accomplished and what is the new level of chance causes which we must accept as inevitable.

HOT CRACKS and TEARS

...in Malleable Iron Castings

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SUMMARY

When white iron is poured into castings, a normal contraction occurs as the metal cools and passes through the hot tearing temperature range. Tears or cracks form from microscopic separations due to restraint. Five general classes of variables may combine with normal contraction to cause tears or cracks. Except for casting design problems, the variables are within the control of foundrymen.

FOUNDRYMEN who make malleable iron frequently face the problem of hot tearing or hot cracking of castings. The castings may have large, obvious hot tears which are easy to discover on the casting surface. Or, the defects may be tiny hot cracks or checks which are difficult to detect. In either case, contraction of the solidifying and cooling metal is the physical phenomenon that makes the tear or crack possible in white iron castings. However, uniform contraction alone is unlikely to cause those defects. Other conditions must be combined with normal metal contraction. When tearing or cracking of castings does occur, the foundryman must determine which of the other conditions has combined with metal contraction to cause the defects. He then can apply a remedy.

Before considering the factors that combine with contraction to cause tears and cracks, the meaning of normal contraction should be made clear. White iron contracts about 3.0-5.0 per cent volumetrically during freezing, depending on per cent carbon in the iron. Higher carbon irons have less total volumetric contraction, lower carbon irons more. Volumetric shrinkage during solidification is accompanied by linear contraction. Linear contraction in inches per second from the beginning of solidification to the temperature of hot tearing has been measured for a special 9⅝-in. long by 0.50-in. diam white iron casting and is shown in Fig. 1 for an iron of 2.20 per cent C.[1]

Fig. 1 represents linear contraction with time of this casting only. A heavier casting would contract more slowly since it cools more slowly. Also, the contraction of the casting is less if the casting is restrained as it contracts as indicated in Fig. 1. Furthermore, the rate at which the casting contracts, slope of curve in Fig. 1, varies with per cent carbon in the iron as shown in Fig. 2. Again, a restrained casting has a slower contraction rate by the restraint. Restraint causes tears or cracks, and it should be recognized that only slight restraint in tension is necessary to cause a crack. Total tearing of the 9⅝-in. long x 0.50-in. diam test bar can be caused by as little as 0.002 to 0.012-in. total restraint or a restraint of 0.0002 to 0.0013 in. per in. The exact value for starting the tiniest hot crack is less than these small dimensions. This, then, is the nature of normal contraction of white iron as it cools through the hot tearing temperature range of 2160-1980°F. It is influenced to a degree by per cent carbon and other variables in the iron and by melting practice. But the figures cited do give the relative magnitude of linear dimension involved in tearing and cracking problems.

Foundrymen cannot expect to do much about this fundamental contraction behavior of the iron within the composition limits of normal malleable iron. Fortunately, however, it appears that most hot tear or hot crack problems are the result of a combination of normal metal contraction with one or more factors including: Feeding of the casting (risering), stability of the mold and molding sand, cores, casting design and miscellaneous causes.

The tears or cracks developed by the above factors can be classified as:

Type I—Shrinkage tears or cracks: Unfed internal shrinkage, unfed external shrinkage

Type II—Mold tears or cracks: Over-size or swelled, under-size, restraint from mold

Type III—Core tears

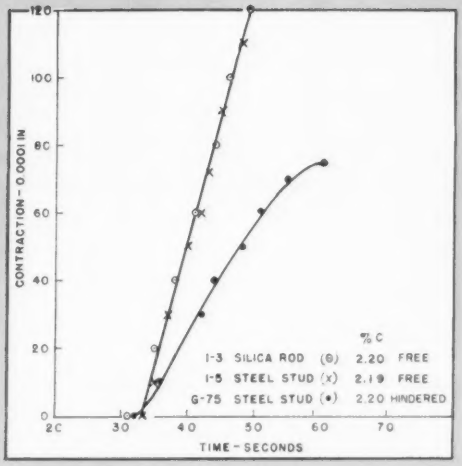


Fig. 1 — Curves indicate contraction rate of white iron casting.[1] End of curve for restrained casting represents hot tearing

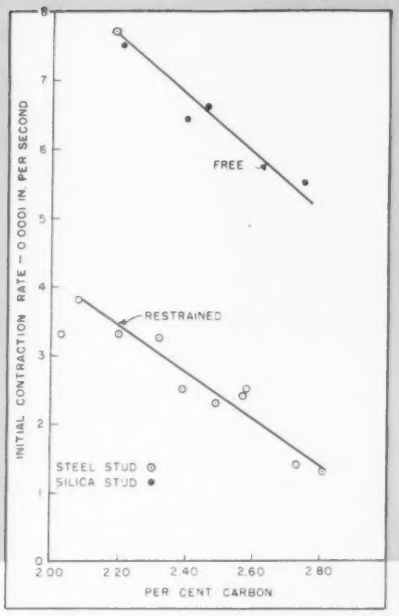


Fig. 2—Relation of the contraction rate, slope of curve in Fig. 1, to per cent C in a 1.30% Si white iron

Type IV—Design and stress tears

Type V—Miscellaneous

Type I—Shrinkage Tears or Cracks—Shrinkage tears and cracks are probably the most prevalent type. They are generated by a combination of normal metal contraction and an improperly risered casting. The casting consequently has a section where unfed internal shrinkage occurs. During solidification, atmospheric pressure pushing on the casting surface produces tensile strain particularly at hot spots. If the tensile strain is severe from pushing in of the surface, it separates or ruptures and produces a large tear as shown in Figs. 3 and 4. This defect is obvious and its cause readily proved since there usually will be a porous shrinkage area under the tear. Furthermore, the defect usually occurs at a hot spot in the casting. Adequate feeding of the casting section will eliminate the tear.

Sometimes unfed shrinkage will not be accompanied by an obvious tensile strain. Instead there may be atmospheric pressure penetration along dendrites, especially if the casting is of a shape such as a cylinder which cools slowly and uniformly. As an example, consider the shank of a casting shown in Fig. 5. Unfed spongy shrinkage on the centerline of this casting is shown on a polished and etched section in Fig. 6. Fractures of this casting show atmospheric pressure breakthrough to propagate as a dendritic crack as in Figs. 7 and 8. The defect may then be called a hot crack rather than a tear. The difference, however, is one of degree. The appearance of these cracks at the etched surface of the casting is shown in Fig. 9. If oxygen diffuses into the crack, the crack will be oxidized and discolored as indicated in Figs. 7 and 8. The slight movement of the dendrites from the pressure effect makes them visible on fractured surfaces even without oxida-

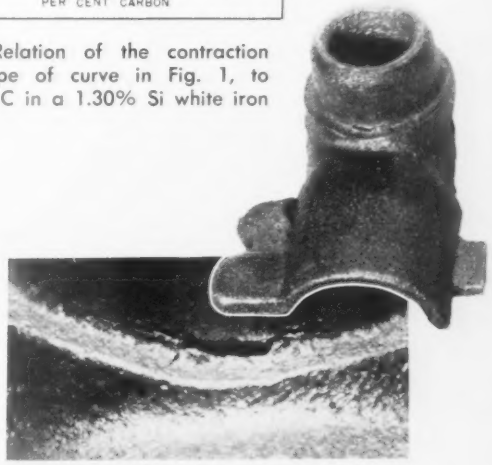


Fig. 3 and 4—A Type I hot tear is visible in the fitting casting, upper right. An enlargement of that tear is shown in the lower view

Fig. 5—Shank of a 0.75-in.-diam casting having Type I hot cracks from unfed internal shrinkage

Fig. 6—Dendritic porous shrinkage on centerline of a ground and etched section of the casting adjacent to the fracture shown in Fig. 5

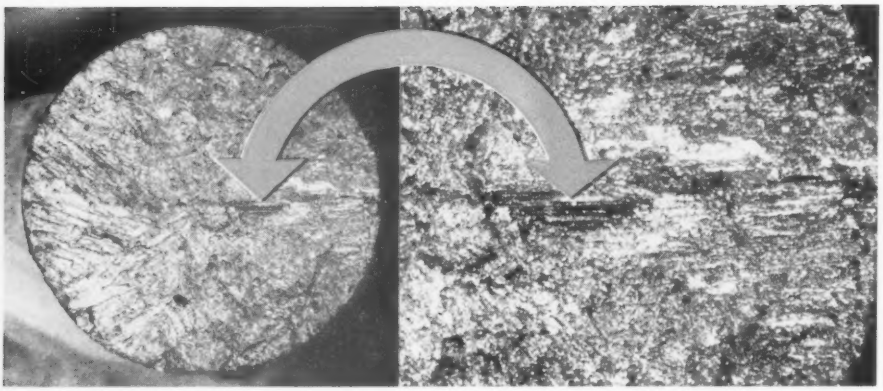


Fig. 7 and 8—At left is the oxidized fracture surface of the casting shown in Fig. 5. Enlargement at right shows oxidized dendrites and the pressure breakthrough to the casting surface at far right

tion. Frequently, the same movement of partially solid metal will cause unoxidized voids to develop in the same casting as in Fig. 10. Malleablizing heat treatments applied to castings with such cracks then show the defect known as spikes.

Specific gravity measurements often are a good means of detecting unfed internal shrinkage. Numerous sound white iron castings have been found to give a specific gravity of 7.720 to 7.790. This is determined by weighing the casting in air and water. Unfed castings are likely to have specific gravity under 7.700.

Conditions Complicate Unfed Shrinkage—The unfed shrinkage, atmospheric break-through type of crack, for example, can be complicated by swells from soft molds, high pouring temperature, jarring of the mold during freezing of the metal, poor bottom boards and other conditions. Basically, however, the cause is a combination of unfed internal shrinkage and normal contraction of the casting. The only positive cure is adequate feeding of the casting.

Unfed external shrinkage is a second source of Type I hot cracks. This occurs when a section is borderline in thickness for the feeding applied. Then it does not develop a spongy internal shrinkage area. Instead, from atmospheric pressure, the entire casting wall moves inward slightly to offset the spongy shrinkage spot which might otherwise develop. This mechanism is indicated in Fig. 11. Its characteristic is a slightly sucked-in surface where a true-to-pattern wall (less shrinkage) should exist.

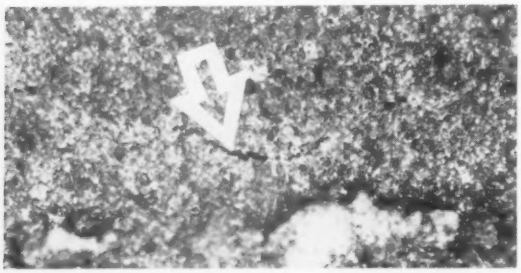


Fig. 9—Hot cracks as they appear on the etched surface of casting in Fig. 5. Oxidized dendrites result if oxygen penetrates the cracks shown

At the temperatures where sucking-in of the wall occurs, the slightest tensile stress is capable of causing tensile strain cracking. This condition is illustrated in the case of the ring casting shown in Figs. 12 to 14.

At the hot crack location in Figs. 12 to 14 a definite suck-in occurred. Note the very minute crack indications at the dendrites in Fig. 14. With this type of defect, linear dimensions of the casting must be compared with the pattern to determine the location and extent of the sucked-in area. Since the cracks are so tiny, magnetic particle or penetrant type inspection is required to detect them on the casting surface.

Type II—Mold Cracks or Tears—Cracks from over-size and/or over-weight castings are similar in appearance to those in Figs. 5 to 14. Slight swelling of a portion of a casting section can cause cracks from tensile strain according to the mechanism shown in Fig. 15. If the enlarged section is fed fully, there will be no spongy shrinkage area under the cracks and the specific gravity of the iron is normal. A linear dimensional measurement must be used to locate the enlargement. If the oversize condition is sufficient to cause unfed shrinkage as illustrated in Fig. 16, atmospheric break-through may occur, and the iron will have lower than normal specific gravity.

The relation of mold enlargement to unfed shrinkage is not commonly appreciated. An increase in volume of the casting from mold enlargement can be greater than the volumetric shrinkage of white iron. That shrinkage during freezing is about 3.0 to 5.0. The increase in section thickness producing an increase of 4.0 per cent in volume of infinite plates and rounds is shown in Fig. 17. An enlargement of the casting shown in Fig. 17 of 0.015 in. in a 0.75 in. diam infinite cylinder will cause a 4.0 per cent increase in its volume. If this enlargement occurs while the casting is freezing and especially if it occurs after temperature has dropped to the mushy stage so that no metal will feed into the section, unfed shrinkage develops. To illustrate further, consider a small chunky casting 2 x 4 x 1.5 in. If this casting is only 0.025 in. over size, allowing for pattern shrinkage, it will be 3.50 per cent larger in volume than expected. Again if this 3.50 per cent enlargement occurs after feeding is no

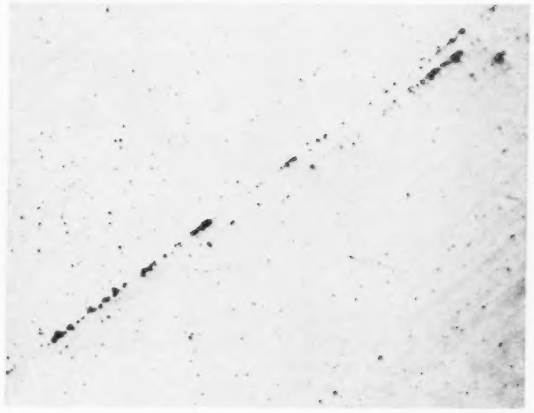


Fig. 10—Unoxidized dendritic voids in polished section near the fracture of casting in Fig. 5

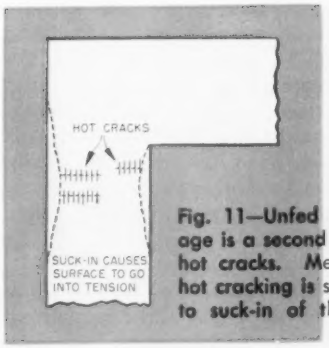


Fig. 11—Unfed external shrinkage is a second cause of Type I hot cracks. Mechanism of this hot cracking is shown to be due to suck-in of the casting wall

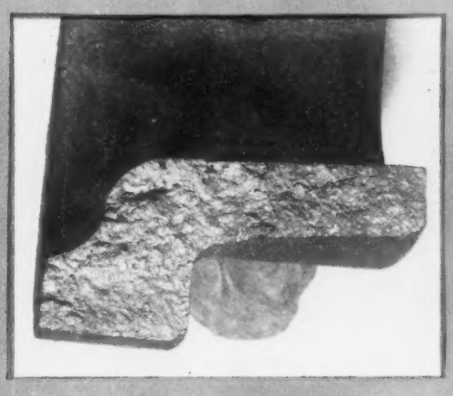
longer possible, the casting will show internal shrinkage.

The common cause of oversize castings is mold wall movement. Extreme movement is illustrated in the case of the 2 x 4 x 1.5-in. chunk in Fig. 18. The two castings were made in molds varying in mold hardness, the softer averaging 50 and the harder averaging 90. Difference in volume of the castings was 23 per cent; difference in weight was 14.1 per cent. While this illustration is extreme, the much smaller dimensional changes shown in Fig. 17 which cause a 4.0 per cent volume change are a common occurrence. As stated, mold wall movement is the factor permitting an increase in casting volume which may exceed volumetric shrinkage and cause unfed shrinkage to occur. Mold wall movement of 0.002 to 0.060 or more inches may occur after castings are poured, the amount depending on the molding sand and the density to which the mold is rammed.

Minimum mold wall movements of molds rammed to over 90 mold hardness have been measured and found to amount to be 0.002-0.005 in. for certain southern bentonite bonded sand mixtures, 0.010 to 0.020 in. for western bentonite bonded sand mixtures, and 0.020 to 0.30 in. for certain fire clay bonded sand mixtures.[2] Molds softer than 90 mold hardness permit higher mold wall movement. For control of cracking or tearing, the risering of castings must be adequate to take care of mold wall movement and oversize dimensions. Otherwise, unfed shrinkage and tensile strain will cause hot crack defects. As an example, the shank of the casting in Fig. 5, with a diameter of 0.75 in., had a variation of 0.030 in. in diam, 7.7 per cent in volume and 5.8 per cent in weight of the total casting. It was found to have a high incidence of cracks whenever its volume increased more than 1.5 per cent through mold wall movement.

How To Detect Wall Movement—The detection of mold instability or mold wall movement as a cause of hot tears and cracks usually can be accomplished by a comparison of the casting and pattern dimensions and by measurement of casting volume and specific gravity of the iron. If the casting dimensions indicate that mold wall movement is causing cracks, some changes in foundry practice are needed. The molding sand

Fig. 12 left—Ring casting with walls sucked in has hot cracks as shown in Figs. 13 and 14. Fig. 13 (center)—Oxidized crack at fractured surface of casting. Fig. 14 (right)—Dendrites accompany cracks at fractured surface



should be controlled so that it produces as hard and strong a mold as possible on the molding equipment available. This means carrying a low moisture content, combined with optimum clay and combustible percentages and the proper sieve analysis. Water should be controlled at about 10 to 20 per cent more than the calculated value determined by the method described in Reference 3. When using bentonites, about 9-11.0 per cent AFS clay, or about 7.5-9.0 per cent true clay is a good range.

Clay content, however, must be adjusted by trial to suit the molding machines. Poor equipment requires lower clay content in the sand to develop higher hardness and strength in the mold. Heavier molding equipment and adequate mulling facilities make it possible to use more clay in the sand and thus to obtain the benefits of very high strength-high hardness molds and minimum mold wall movement.[2] The clay contents cited are in the middle of the range with respect to the equipment factor. Combustibles must be neither too high nor too low. A value of 4 to 8 per cent is common, but this depends on the source of the combustibles. A sieve analysis of the usual four screen type works very well.

Other Factors Affect Wall Movement—With the foregoing molding sand factors controlled, there are others that can cause excessive mold wall movement or have the effect of delaying the time of complete solidification at the casting skin, as with an insulating, reactive sand. Fines in the sand should be held to less than 5.0 per cent on 200 mesh and below for a sand of 65 AFS number. An increase of FeO content of the sand indicates excessive dirt and sand deterioration and calls for the addition of new sand to the system. The danger level of FeO content, however, must be evaluated in terms of the initial level of the new raw materials. Hot sand prevents proper mulling in the time available. Accumulation of dead clay from hot sand or high metal to sand ratio is also harmful. Inadequate mulling time prevents proper distribution of water and bond and contributes to these problems.

Sometimes, restraint by the mold is regarded as a cause of tearing. However, as pointed out earlier, mold wall movement is expected after the casting is poured. A consideration of the density of molding sand indicates further that contraction of the casting should be amply accommodated. Table I gives the density of molding sands commonly encountered in the foundry.

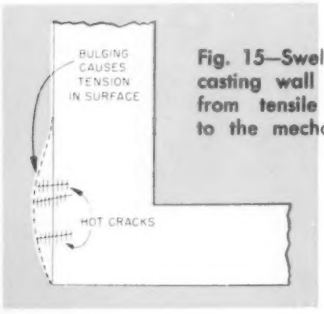
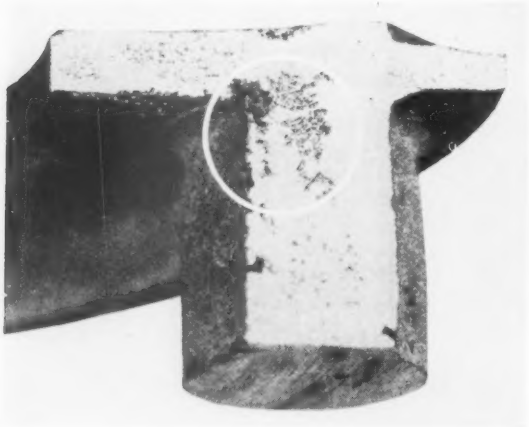


Fig. 15—Swelling or bulging of casting wall can cause cracks from tensile strain according to the mechanism shown here

Fig. 16—Example of a swelled boss on a casting, causing a hot spot, unfed shrinkage and a tear



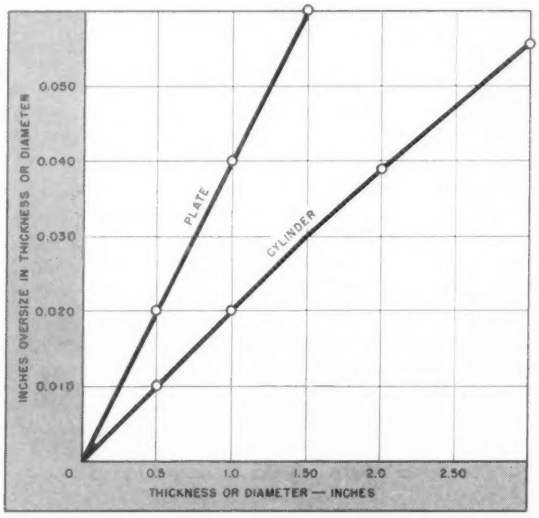


Fig. 17—Larger section thickness increases volume of infinite plates and cylinders by 4%. Conservative values shown do not include effect of increased length and width on volume

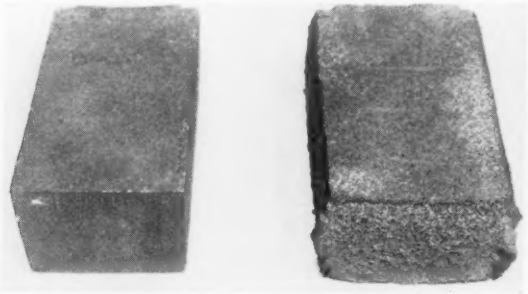


Fig. 18—Movement of mold walls causes oversized castings. Mold of 90 hardness produced casting at left, a 50 hardness mold the one at right

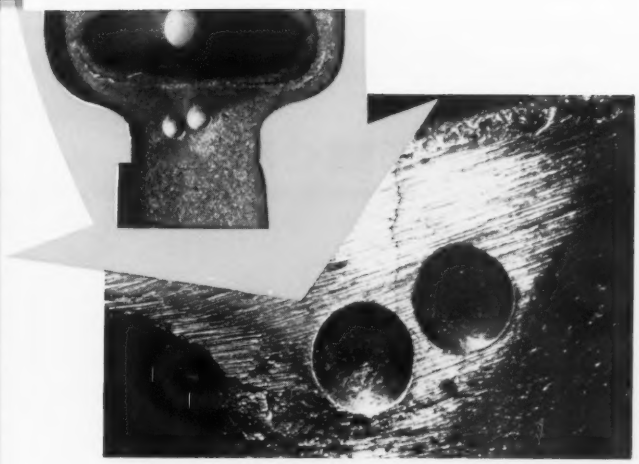


Fig. 19 (top)—A clamp casting exhibits a core tear above and between the circular cavities. Fig. 20 (bottom)—An enlargement of the defect

Since most molds in malleable foundries are rammed to about 65-80 lb per cu ft sand density, there is considerable movement of the sand possible to accommodate the casting. As clay content decreases, however, this accommodation does not exist. Unless an unusually high dry strength is developed, it does not appear that mold restraint will cause tears or cracks. Again, if mold restraint does develop, it can be measured as a linear dimension which does not display the expected contraction when compared with the pattern.

TABLE I—Density of Typical Molding Sands*

Material	Density lb per cu ft
1. Raw silica sand, clay free	100-115
2. Dry sand plus southern or western bentonite and carbonaceous additives	92-105
3. Molding sand tempered with water	
a. Riddled	50-65
b. Jolt-squeeze mold to 70-85 mold hardness	65-85
c. Hard rammed to 90-96 mold hardness	92-105

*These densities assume there is about 9-11 per cent AFS clay and 4-8 per cent total combustible material in a 60-75 AFS sand.

Type III—Core Tears—A core tear is shown in Figs. 19 and 20. This defect is caused when the normal contraction of the metal is prevented by a noncollapsing core. An excess of core binders, an unfortunate core sand sieve analysis and dense packing of the core sand are typical factors that produce noncollapsing cores. Table II illustrates how ramming and sand ingredients may alter the density and core wall movement of a particular core sand. A minus value in the table indicates expansion of the core. The values apply only to a specific casting having a 2-in. metal section made in core sand but serve to illustrate relative effects of core wall movement.

TABLE II—Effect of Ramming and Sand Mix on Density and Wall Movement of Cores

Sand 65 AFS, 4 screen	Rammed	Density lb per cu ft	Core Wall Movement, in.
Oil sand core	soft	107	0.002
Oil sand core	hard	111	—0.002
Thermo-setting, resin bonded core	soft	95	0.011
Thermo-setting resin	hard	98	0.003

Core tears usually can be remedied by making collapsible cores and reducing core density. Cereal is helpful for obtaining lower density in oil-sand cores.

Type IV—Design and Stress Tears—Design and stress tears are grouped together because of a common cause. They occur in castings which, because of their design, cool nonuniformly in their various sections. Contraction causes tensile stresses to arise in the solidified portion of the casting and the accompanying tensile strain causes rupture of the hottest section under strain. Sharp temperature gradients within the cooling casting aggravate this type of tear. In studying tears from this source, each casting presents its own problems. No effort will be made in this article to go into the design phase. However, it should be pointed out that this is one of the prevalent causes of tearing which foundrymen alone cannot fully correct. They must work through design engineers to improve the casting design.

Type V—Miscellaneous—A number of miscellaneous conditions can contribute to tearing and cracking problems. For example, gating, which produces unfavorable temperature gradients, may cause tears or cracks from tensile strain. The two feeding systems in Fig. 21 illustrate risering which favors uniform temperature cooling in one case and temperature gradient cooling in the other. The latter promotes hot cracking with a definite pattern of cracks as illustrated. The colder end of the casting forms a solidified arch, dotted line AB. This restrains contraction of the hotter portion close to the feeder and causes cracks to develop with the pattern shown. While risering for better yield usually requires temperature gradient cooling, it is unfortunately true that temperature gradient cooling promotes hot cracks. Attempts to increase yield by this method are accompanied by an increase of hot cracks on certain castings.

Poor molding equipment and accessories may not use the sand to best advantage. Flasks, bottom boards, weights and other equipment may be inadequate. Metal condition and pouring temperature always are important. This article does not attempt to consider the various metallurgical problems which may enter into tearing. Rather, an effort has been made to point out major factors which occur on such a gross scale as to overshadow subtle changes in metallurgical properties.

References

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2. R. W. Heine, "Molding Sands, Molding Methods, and Casting Dimensions," *Transactions*, AFS, Vol. 64, p. 398, 1956.
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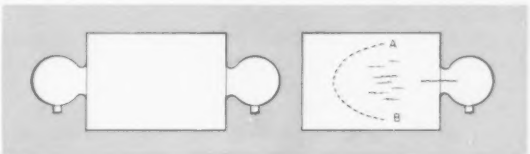


Fig. 21—Double feeding, left, provides uniform cooling. Single feeding gives temperature gradients, resulting in solidified arch AB which restrains contraction of hot end, causing cracks

Questions and Answers

Fine cracks on surface caused by shrinkage . . . Application of abrasive facing to castings . . . Hard areas on castings are not due to sulphur-manganese ratio . . . Proper feeding will eliminate holes in casting . . . Iron contains gas

Shrinkage in a Brass Casting

QUESTION We are making yellow brass castings from an alloy containing 67 Cu, 0.75 Sn, 2 Pb, 0.3 Ni and remainder Zn. Just before pouring we add ½-lb Pb and 3 oz Al per 100 lb metal. We are having trouble with a spider-web appearance on parts of the surface, as shown in the accompanying specimen. Pouring temperature is 2180 to 2200° F from a bottom pour crucible. Sand shows 7 to 7.5 per cent moisture, 30 to 35 permeability, 14 psi green strength. Mold hardness ranges from 65 to 80.

ANSWER Since you are using aluminum additions to the brass it was suspected that the defect you descriptively term spider-web might be aluminum oxide inclusions. However, under the magnifying glass the spider web is shown to be a maze of very fine cracks. The additional fact that the location was at the junction of light and heavy sections suggested the possibility of shrinkage.

Examination of the fractured section verified that surmise since the fracture was coarse and open, showing the well known interdendritic or feathery formation as well as a lemon-yellow color. Adjoining section showed a uniformly fine grain with the usual pinkish color. Proper feeding will eliminate the trouble and we suggest addition of another gate where the defective area occurs. Possibly increasing the size of the present gate thickness to ¼-in. or double the one now used might be an answer.

It appears to us that your present runner is much too large and a needless luxury since it permits only a 40 per cent yield. Instead of the ⅞ x ⅝-in. runner in cope and drag, we suggest one 9/16-in. square only in the drag. Gates to the casting could be ¼-in. square at an angle of about 30° as you now have them without the curved arrangement. Pouring uphill also might help. Yellow brass should be forced into the mold cavity as quickly as possible and the gates should be larger than for red brass.

Your pouring temperature appears to be about 100° higher than usually employed for yellow brass. Hudson suggests a pouring range of 1920 to 2100° F for heavy to light section castings. The AFS booklet on nonferrous alloys recommends an average of 2050°, pointing out that with high temperatures more zinc fumes are produced. Probably you can use a much finer molding sand than your present type to obtain smoother surfaces and thus reduce the amount of cutting down or rough polishing.

Abrasive Facing on Castings

QUESTION We are planning to pour some cast iron stairway treads which are specified to be safety abrasive cast iron treads; the face of the tread is to have an abrasive grit integrally cast into the surface. We will appreciate any information on the method of doing it. Also we would like to know what material is used in the process.

ANSWER Production of abrasive-faced treads requires some skill and experience to obtain the desired results, and you will have to do some experimenting. Essentially the procedure is to make the mold from the pattern in the usual way, then remove it from the pattern. The mold face or area on which the abrasive facing is desired is coated with an adhesive, which may be thin clay wash, molasses water, sulphite liquor or water glass (sodium silicate). Probably a water glass, or sodium silicate, solution is best for the purpose. Adhesive preferably is sprayed on to obtain a thin, uniform coating.

After the adhesive is in place, the abrasive material, which may be silicon carbide or aluminum oxide grit, is distributed over the sticky area through a screen or sieve of the same mesh as the abrasive so that a thin, uniform layer is obtained. Grit or mesh size of the abrasive may range from 20 to 60. Sometimes the layer of abrasive is sprayed again and a second layer of abrasive applied. Then the abrasive-faced portion is torch dried to drive off the moisture so that no boiling or agitation occurs when the molten metal is poured into the cavity. Metal should be hot so that it will penetrate between the grains as well as cause fusion of the adhesive.

Has Trouble with Hard Spots

QUESTION We are making a gray iron casting weighing approximately 70 lb with ⅝ to 1 in. sections which was found to contain hard spots on machining. Composition showed 3.65 TC, 2.45 Si, 0.080 P, 0.45 Mn, and 0.120 S. Adjacent areas show hardnesses from 220 to 380 Brinell. Metallographic examination shows both areas contain type A graphite with a pearlitic matrix in the softer and an acicular structure in the harder areas. Casting is made in green sand and dumped at about 1300 to 1450° F. There are no indications of sand trouble. Residual elements determined spectrographically are less than 0.1 per cent. While the analysis is not what is desired for the casting, we wonder whether the low manganese-sulphur relationship might be the cause or perhaps the silicon-carbon ratio.

ANSWER It is extremely doubtful that the ratio of sulphur to manganese is a factor in your difficulty with hard spots in the casting. It is considered desirable to have a manganese content at least three times the sulphur, and your present 0.45 Mn easily meets the requirement. Since design of the casting and the method of gating are not available any diagnosis is not possible.

As you undoubtedly are aware, only small differences in cooling rates or gradients are required to produce different transformation products such as pearlitic and acicular structures. A temperature of 1450° F is well above the beginning point of those transformations. In the opposite direction or heating up and quenching from 1450°, marked hardening and an acicular structure can be produced. Coming down in temperature from 1450° is worse since hard edges are common under such conditions.

In a casting of this size and analysis and cooled to well under 1300° F before shakeout, the normal structure expectancy would be much ferrite in pearlite. If the iron is oxidized in melting, poured at too low a temperature or too slowly, or contains pig iron from a poorly operating blast furnace, some difficul-

ties which are hard to account for may and do occur.

Holes Result From Shrinkage

QUESTION We have been running into considerable scrap on pipe flange castings up to 6 in. in diam. Alloy is 85-5-5-5, melted in 825-lb crucibles in gas-fired, tilting furnaces. Charge is composed of 10 to 15 per cent borings, 30 to 40 per cent ingot and the remainder uncleaned returns. Borings are placed in the crucible and followed by the ingot and sufficient returns to fill the pot. To complete the charge, the remainder of the returns is placed over the furnace hole cover in a "saucer" to heat up, then pushed in as the charge in the crucible melts down.

Melting is done on the oxidizing side as checked with an atmosphere analyzer showing 10.5 per cent or more CO_2 and zero H. Molds are made on jolt-squeezer machines, and mold hardness is 80 to 90. Sand is bank sand (about 140 AFS fineness), bonded by bentonite. Wood flour additions are made. Moisture is 6 per cent, permeability from 22 to 30 and green strength 12 to 14.5 psi. Our trouble with the castings is porosity in the flange and cup which is exposed during machining. Holes vary in size from pinholes to ⅛-in. in diam. We have made numerous tests to find the cause, but without results. Castings are poured at 2000°F, after others which require a higher pouring temperature.

ANSWER Gas pickup may have some slight effect, but your main trouble is shrinkage due to lack of sufficient feeding of the castings. That was ascertained by fracturing the casting and examining the structure with a high-power magnifying glass. Appearance showed yellowish areas with the interdendritic or feathery pattern, but none of the pear-shaped shiny interior holes indicative of gassy metal.

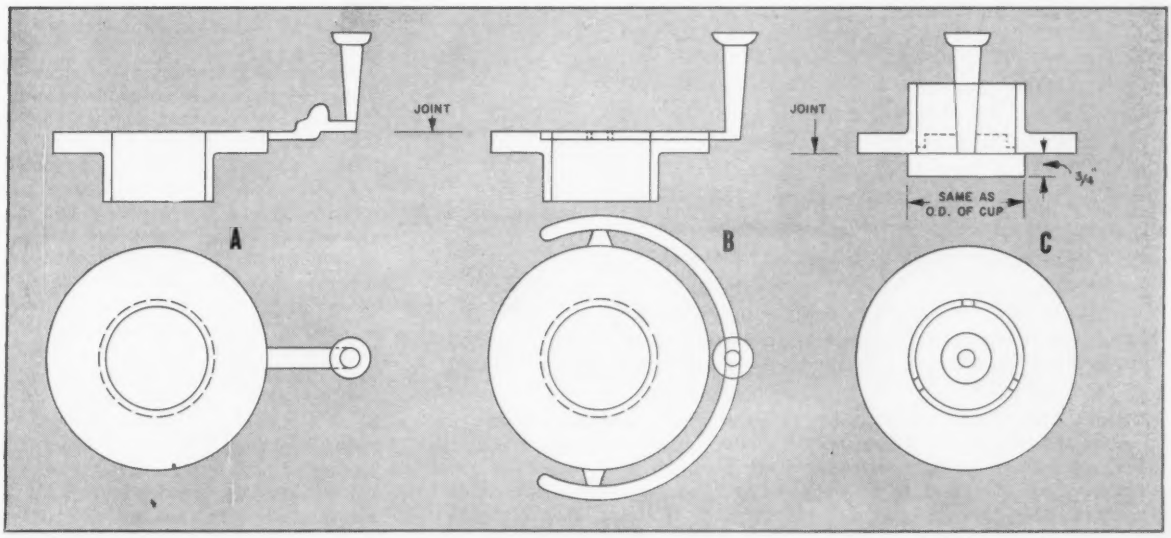
We believe the difficulty can be overcome by a change in gating to insure proper feeding, and our preference would be the method shown at *C* in the accompanying sketch. This employs a sprue in the center, opening into a reservoir from which the molten metal flows upward into the casting cavity through three small gates. A variation would be to place the reservoir above the parting line, as indicated by the dotted lines, and to lead into the bottom edge of the cavity with three close-coupled or short-necked gates 120 degrees apart. With these center gating procedures, where the sprue is at some distance from the edge of the mold, it is advisable to use a runner basin from near the edge of the mold so that the pouring crucible lip will not be too high above the sprue opening. That arrangement helps the pourer, of course, but primarily its use is to reduce turbulence and entrainment of air.

If you do not want to try either of these ideas, or the pattern, etc., will not permit, then we suggest the method shown at *B* in the sketch. That employs a semicircular runner with two ingates on opposite sides. The runner is extended a short distance beyond the gate openings to catch any dirt or dross carried in with the first rush of metal, which flows to the end and then backs up.

Gas in Iron Cause of Holes

QUESTION We make split, chilled rim sprockets and from time to time run into trouble from holes in them as shown in the accompanying specimens. Chills for the rim are dry and the cores are dry and not too hard. While the sand was a little on the wet side, we do not believe that it was the cause of the holes.

ANSWER Your belief that the holes in the sprocket castings are not caused by wet sand is correct since their appearance with bright shiny surfaces indicates that they are the result of gas in the metal. Possibly either the cupola spout, lining of the ladle or the lip of the ladle was not dried out thoroughly prior to use. Moisture in the refractory at high temperature of the iron is turned into water vapor and perhaps dissociated into its components oxygen and hydrogen. Those gases are held in solution until freezing or solidification begins. By that time a solid



Sketches indicating present and suggested methods of gating bronze pipe flanges to provide solid castings

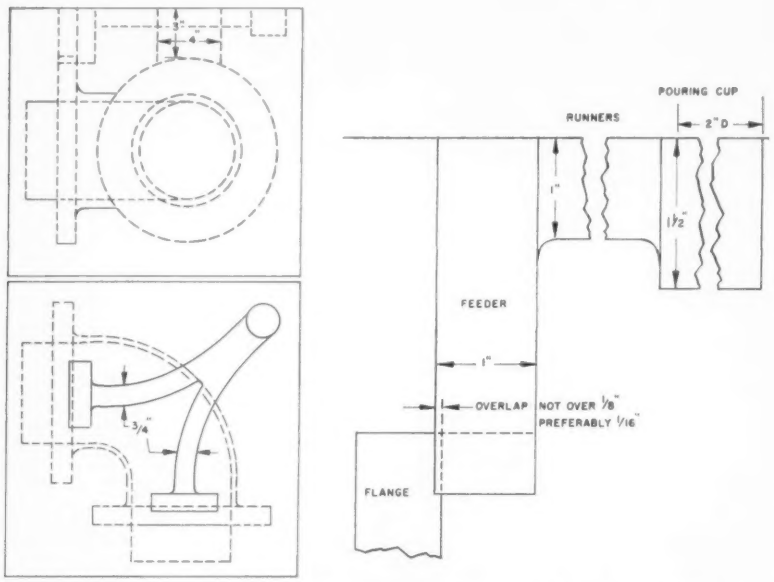
skin has formed at the mold interface which prevents the escape of the gases, resulting in the formation of small pear-shaped holes just under the surface of the casting.

Pipe Elbows Develop Leakage

QUESTION During the past month we have produced several standard, 6-in. flanged elbows in silicon bronze (4 Si, 1 Mn) and have had considerable trouble with leakers and with porosity on the faces after machining, as indicated on the sketch. For years we have made standard pipe fittings from ⅛ to 2½ in. without trouble, but from 3 in. up, we have difficulties. We gate into the two adjoining flanges from a 1½-in.-diam sprue and use 2-in.-diam risers on the opposite sides of the flanges. Metal is poured at 1850°F. We use regular molding sand, and cores are made from beach sand with a dry core compound. Risers and sprue are 8 in. high. Flange is ⅞-in. thick, and the wall of the elbow is ¼-in. thick.

ANSWER Description of your trouble with the large elbows leads us to suspect that it is due to lack of proper feeding. We suggest that you fracture some of the defective castings and examine the structure for indications of the pine-tree or feathery characteristics of interdendritic porosity. You mention that you are pouring at 1850°F, but suspect that you mean 1950°. Even that temperature seems somewhat low; we suggest that it be increased to in the range from 2030 to 2080°F.

The real answer to your problem, however, is to change the method of gating to insure adequate feeding of the castings, and we are submitting a suggested procedure, as shown in the accompanying sketch. This is an application of the "Connor" feeder, sometimes called the "kiss" gate. You will note that in the enlarged section of the attachment of feeder to the flange, there is a narrow connection, not over ⅛ in. wide, and preferably narrower, between feeder and flange. If that does not work satisfactorily, the feeders can be placed directly over the flanges. In that case it might be advisable to use thin cut-off cores with ¼-in. slots to aid in removal.



Gating into risers over flanges in large silicon bronze elbows suggested for good feeding. Narrow connection between risers and casting is advised

Wants Cupola Operating Data

QUESTION We have a 32-in. ID cupola and pour a heat of about 5000 lb, which is used to make cast iron soil pipe. We use selected cast iron scrap as the charge and do not get very good efficiency. Could you give us information on the heat procedure for making pipes? Can 200 lb be tapped at a time? We have literature on alloy briquets, but we do not understand the procedure.

ANSWER Your reference to not obtaining good efficiency in operation of your cupola is not clear to us since you do not give any details. Possibly an outline of procedure might be the answer. A cupola lined to 32 in. will melt about 3¼ tons per hour with an iron-to-coke ratio of 8:1 with an air supply of 1810 cfm. The bed should be 40 to 46 in. above the tops of the tuyeres. Suggested coke splits between charges is 65 lb, and the iron charge then would be 520 lb. If your coke quality is not good, you may have to reduce the weight of the iron charge while leaving the coke at 65 lb. That amount of coke is designed to supply the proper combustion conditions and should not be changed.

With a heat of 5000 lb, the cupola will be in operation only about 45 minutes if the cupola is running normally. Your mention of tapping 200 lb at a time is not clear since intermittent operation of opening and closing the taphole is quite common. In such operation, the tuyeres and slag hole must be high enough above the sand bottom to provide sufficient space to hold the iron melted between tappings. At the normal melting rate, the 32-in. cupola will melt about 109 lb per minute, and you will have to ascertain the interval between tappings to determine the height of the tuyeres and slag hole above the bottom. For purpose of calculation, the well of a 32-in. cupola will hold about 1250 lb per foot of depth.

With reference to your question on use of briquets, it might be pointed out that they are employed to replace portions of the particular elements lost or oxidized during the melting process. Usually it is estimated that the silicon loss is about 10 per cent and the manganese about 20 per cent. That is, the iron charge entering with 2 per cent silicon and 0.60 per cent manganese would come over the spout with 1.80 per cent silicon and 0.48 per cent manganese. By addition of the proper amounts of ferrosilicon and ferromanganese briquets in the metal charge, the molten iron over the spout will have the same silicon and manganese as the charge materials. They also can be used for adjusting the metal composition.

Method of determining the quantity of ferroalloys to be added is not difficult. For example, assume that you desire to produce an iron containing 2.25 per cent silicon and 0.60 per cent manganese from cast iron scrap containing 2.0 per cent silicon and 0.55 per cent manganese. Using a 1000-lb charge for simplification, the raw material will supply 20 lb silicon and 5.5 lb manganese (1000 × 0.02 or 20, and 1000 × 0.0055 or 5.5). To obtain the desired iron, however, the silicon in the 1000-lb charge would have to be 22.5 divided by 0.9 or 25 lb, and the manganese 6 divided by 0.8 or 7.5 lb. To make up the difference of 5 lb in silicon and 2 lb in manganese, you would add five ferrosilicon briquets each containing 1 lb of silicon and one ferromanganese briquet containing 2 lb of manganese.

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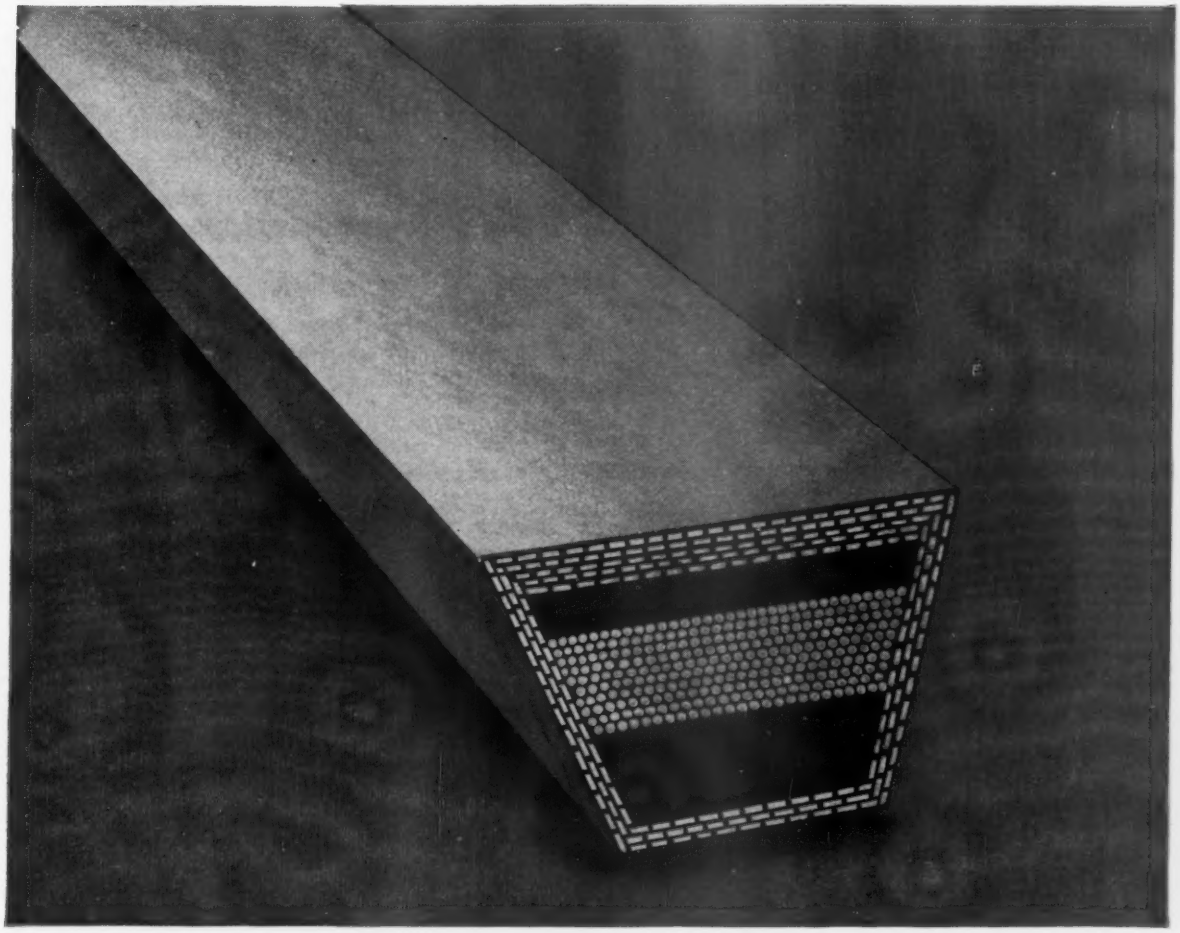

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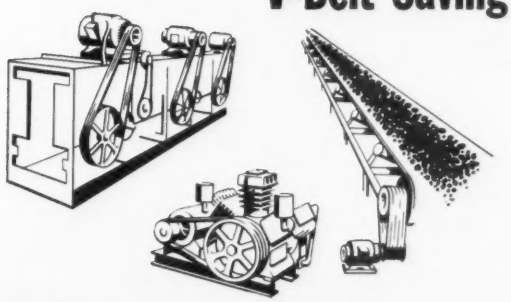

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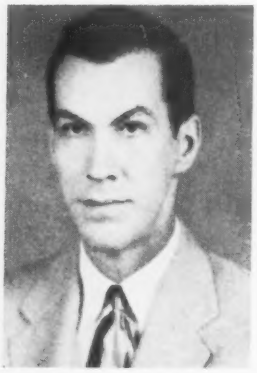

● EDWARD A. SHORT
. . . heads Castings Branch

● JAMES F. CONNAUGHTON
. . . Wheelabrator Corp. v. p.

● J. KEITH LOUDEN
. . . Lebanon Steel executive

● A. ROTTINGHOUSE
. . . becomes production mgr.

EDWARD A. SHORT has been appointed chief of the Castings Branch, Iron and Steel Division, Business and Defense Services Administration, Washington, succeeding **Sands G. Falk,** manager of marketing research, Falk Corp., Milwaukee. Mr. Short is on loan from his position as sales engineer, Mid-Continent Steel Casting Corp., Shreveport, La. He was chief metallurgist, Keokuk Steel Casting Co., Keokuk, Iowa, from 1936 until 1953, when he was transferred to the affiliate company, Mid-Continent Steel Casting Corp., as assistant works manager. He entered the sales department in 1954. Widely known in the steel castings industry, Mr. Short is vice chairman of the Technical and Operating Group, District III, Steel Founders' Society of America.

A. Dean Meyer has been appointed general manager, Ajax Electrothermic Corp., Trenton, N. J., succeeding **Dr. Guilliam H. Clamer,** who has held the position since the company was formed in 1920. Dr. Clamer will continue as president. Mr. Meyer is also vice president and a director of the company, which he joined in 1929. **William J. Werts,** with Ajax Electrothermic for 28 years, has been named plant manager. He was formerly purchasing agent and traffic manager. **Thomas J. Turner** was named buyer.

Daniel A. Walther has been appointed chief engineer, Dayton Steel Foundry Co., Dayton, O., succeeding **E. Leslie Miller.** Mr. Walther is also president of Moraine Mfg. Co., a subsidiary of Dayton Steel.

● **James F. Connaughton** has been elected executive vice president, Wheelabrator Corp., Mishawaka, Ind. A graduate of University of Cincinnati, for many years he was with Baldwin-Lima-Hamilton Corp., Philadelphia, as vice president-general manager of the Eddystone (Pa.) Division. Other changes at Wheelabrator Corp. include the following: **Harold M. Miller,** since 1944 a vice president, was named senior vice president; **Jacob A. Schmidt Jr.,** former treasurer, is now secretary-treasurer; **John M. Wolf,** assistant treasurer, was appointed controller; and **Edward T. Sullivan** has been appointed assistant secretary-assistant treasurer. Other officers of the company were re-elected. **Otto A. Pfaff** is president.

● **J. Keith Louden** has been named vice president, chief executive officer and a director, Lebanon Steel Foundry, Lebanon, Pa. After Oct. 1 he will also become executive vice president, succeeding **Edward G. Williams,** who retires but will continue as a director. Mr. Williams joined the company last year. Until recently Mr. Louden was vice president of the York Division, Borg-Warner Corp., York, Pa., and general manager of its commercial division. He joined the former York Corp. in 1948 as assistant to the president, became vice president in 1949, and a director in 1951.

Henry C. Bray has joined Stoller Chemical Co., Akron, as sales representative and technical advisor. He was formerly associated with Wauseon Foundry Co., Wauseon, O.

● **A. Rottinghouse,** formerly plant superintendent, Delhi Foundry Sand Co., Cincinnati, was recently appointed production manager there.

Stanley R. Kuhns has been named assistant works manager of Cleveland operations, Aluminum Co. of America, Pittsburgh. **Marvin E. Gantz Jr.,** formerly assistant manager of the company's Cleveland permanent mold foundry, has succeeded Mr. Kuhns as manager of the ingot plant there. In other changes at the Cleveland Works, **John Wallis** has been appointed assistant superintendent of the permanent mold plant. **George A. Purdy** succeeds Mr. Wallis as assistant superintendent of the sand foundry. **Donald V. Lippenberger** replaces Mr. Purdy as chief metallurgist of the sand foundry.

Lyle L. Clark has been appointed manager of operations at the tantalum-columbium plant under construction near Muskogee, Okla., for Fansteel Metallurgical Corp., North Chicago, Ill. Since 1953 Mr. Clark has been supervisor of foundry research, Armour Research Foundation, Illinois Institute of Technology. Previously he spent 18 months with Buick Motor Division, General Motors Corp., Flint, Mich., where he became assistant superintendent of melting and metallurgy.

David P. Hall, formerly assistant manager of the New York division, Island Creek Coal Sales Co., Huntington, W. Va., has been named assistant to the director of metallur-

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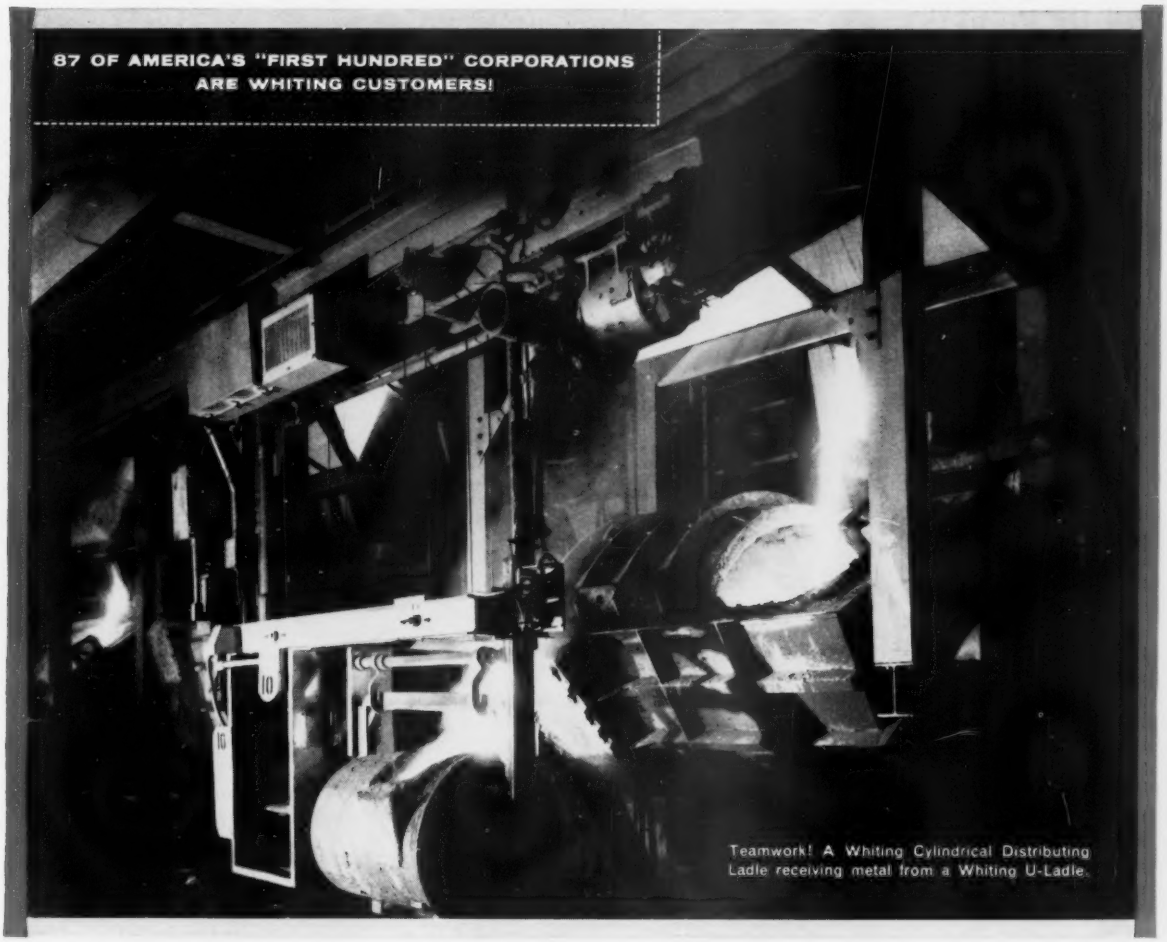

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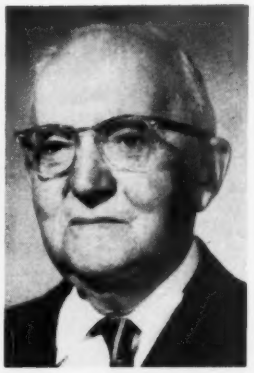


● IRVING DANIELSON

. . . completes 60 years

gical sales, with headquarters in Pittsburgh. Mr. Hall is the son of the late John Howe Hall, who for many years was well known in the steel foundry industry.

● **R. W. Munger** has been named operating manager of the foundry division, Electric Auto-Lite Co., Toledo, O. With the company since 1934, and manager of the Mt. Vernon, O., foundry since 1946, he will direct manufacturing operations of the division. **R. M. Sellers,** formerly manager of the Fostoria, O., foundry, has been appointed sales manager for the division. He joined the foundry division in 1931. Other appointments include **Curtis C. Strouse,** assistant in charge of the Fostoria foundry, and **Donald W. Bennett,** assistant in charge of the Mt. Vernon foundry.

● **Robert W. Frank** has been elected vice president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., with duties as a sales executive. Mr. Frank was formerly vice president-mill machinery sales, Blaw-Knox Co., Pittsburgh. Prior to Blaw-Knox's merger with Continental Foundry & Machine Co., he was president-general manager of Lewis Foundry & Machine Division of Blaw-Knox and a director of the parent company.

● **Dr. David C. Ekey** has been appointed professor of industrial engineering, Georgia Institute of Technology, Atlanta. After graduation from Ohio State University, he was associated with Murray-Ohio Mfg. Co., and Cleveland Automatic Machine Co., Cleveland, later becoming a project engineer for Ohio Malleable Iron Co., Columbus, Ohio. In 1951 he was named assistant professor of industrial engineering and head of the foundry option course, Pennsylvania State University, and since 1955 has been director of research, Lebanon Steel Foundry, Lebanon, Pa.

● **Robert L. Reed** has been appointed regional manager of the Pittsburgh sales territory, Electro Metallurgical Co., division of Union Carbide Corp., New York. He has been acting regional manager of the Pittsburgh region, which includes Cleveland.

● **Karl Koehn** hase been named assistant vice president of sales, Commercial Contracting Corp., Detroit. Since he joined the company in 1952 he has supervised machinery installation projects in the steel industry and will continue to act as representative in the Pittsburgh territory. Previous associations include Mesta Machine Co., Taylor-Wilson Mfg. Co., General Motors Corp., and Pittsburgh Engineering & Machine Co.

● **Irving Danielson,** vice president, Chicago Wheel & Mfg. Co., Chicago, was honored recently for 60 years of continuous service to the grinding wheel industry. He was presented with a plaque from the Grinding Wheel Institute, Cleveland. Mr. Danielson joined the shipping department at the original Chicago Wheel plant, 60 years ago, and continues on an active basis as its vice president.

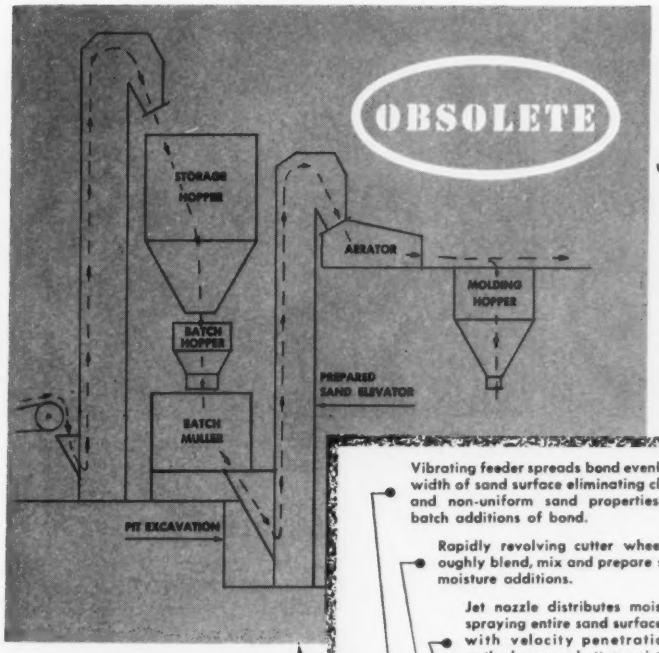
● **Nicholas G. Hayek,** formerly manager, Mezger Machine Co., Kallnach, Switzerland, has been named manager of the Zurich, Switzerland branch recently opened by Knight Engineering Establishment — Vaduz, Liechtenstein, to specialize in foundry engineering, including moderniza-

● ROBERT W. FRANK

● KARL KOEHN

● ROBERT L. REED

● NICHOLAS G. HAYEK



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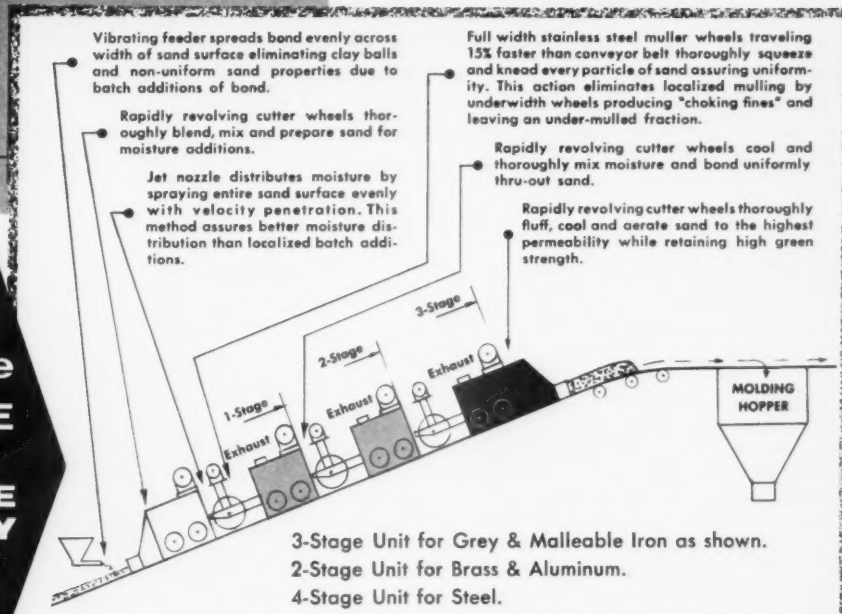
Vibrating feeder spreads bond evenly across width of sand surface eliminating clay balls and non-uniform sand properties due to batch additions of bond.
Rapidly revolving cutter wheels thoroughly blend, mix and prepare sand for moisture additions.
Jet nozzle distributes moisture by spraying entire sand surface evenly with velocity penetration. This method assures better moisture distribution than localized batch additions.
Full width stainless steel muller wheels traveling 15% faster than conveyor belt thoroughly squeeze and knead every particle of sand assuring uniformity. This action eliminates localized mulling by underwidth wheels producing "choking fines" and leaving an under-mulled fraction.
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Rapidly revolving cutter wheels thoroughly fluff, cool and aerate sand to the highest permeability while retaining high green strength.
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● KARL KOEHN
. . . *assistant sales v. p.*

● ROBERT L. REED
. . . *regional sales mgr.*

● NICHOLAS G. HAYEK
. . . *European branch mgr.*

MEN OF INDUSTRY

● WILLIAM D. RADDATZ

● CLAUDE E. CHRISTIE

Electro-Alloys Division appointments

● D. S. LILLIBRIDGE

● WALTER E. SPINK

Chicago Tramrail Corp. managers

tion, mechanization and plant design. Address of the branch is Bahnhofstrasse 17, Zurich, Switzerland. Knight Engineering Establishment was formed by Lester B. Knight & Associates, Chicago, to handle its European work.

● **Claude E. Christie** and **William D. Raddatz** have been appointed vice presidents, Electro-Alloys Division, American Brake Shoe Co., New York. Mr. Christie will continue as works manager of the division's plant in Elyria, O., a position he has held since 1953. He joined the company in 1923 as plant engineer, became finishing superintendent in 1935, and general superintendent in 1947. Mr. Raddatz, who has been sales manager of the division since 1955, will continue to perform these duties. With the company since 1937, he was named production manager in 1938 and sales engineer in 1940.

Clyde E. Claus has been appointed manager of the Grand Rapids, Mich., plant, Doehler-Jarvis Division, National Lead Co., New York, succeeding **Robert H. Mayer** who has resigned. Mr. Claus joined Doehler-Jarvis in 1917. After engineering assignments in Brooklyn, N. Y., and Pottstown, Pa., he became sales engineer in New York and was made Chicago district sales manager in 1943. Since 1948 he has been sales manager in Grand Rapids, specializing in die-cast applications in the Michigan and Ohio area.

Curtis C. Drake, plant superintendent and sales representative, Griffin Wheel Co., Denver, has retired and will act as a foundry consultant. He joined the company in 1916 and became superintendent of the Denver plant in 1939, later adding duties as sales representative for the company in the Rocky Mountain area. Mr. Drake is a former chairman of the Rocky Mountain Chapter of the American Society for Metals, former chairman of the Timberline Chapter of the American Foundrymen's Society and is a national director of the AFS.

Ralston E. Mingledorff has been elected president and general manager, Savannah Machine & Foundry Co., Savannah, Ga. **Walter L. Mingledorff Sr.,** president of the company since its formation, was named chairman. **Neil Mingledorff** has been named first vice president and **Nick Karacostas Jr.,** second vice president and manager of marine construction and repairs. Ralston Mingledorff joined the company in 1938 and was elected a vice president in 1947. Neil Mingledorff, with the company since 1948, continues as foundry manager.

David Duff recently was appointed manager of product engineering for the Everett-Lynn Foundries, General Electric Co.'s foundry department, Everett, Mass. He was graduated from University of Pittsburgh and took graduate work at Carnegie Institute of Technology. He joined the small steam turbine department of GE in 1953 as a materials engineer. Previously he was associated with Jones & Laughlin Steel Corp., Pittsburgh, and the Department of Commerce, Washington, where he worked in the alloys field.

Howard J. Williams was honored recently by New Jersey Silica Sand Co., Millville, N. J., at a dinner announcing his retirement as sales manager, a position he has held since 1935. He joined the company in 1925 as plant superintendent. Active in the Philadelphia Chapter of the American Foundrymen's Society, Mr. Williams also served for many years in national committee work of the AFS Sand Division.

● **D. S. Lillibridge** was recently appointed sales manager, Chicago Tramrail Corp., Chicago. **Walter E. Spink** has succeeded Mr. Lillibridge as Detroit district sales manager. Mr. Spink was formerly with Fisher Body Division, General Motors Corp., Detroit.

Joseph E. Foster and **James Kubbs** recently joined the technical staff of American Society for Metals, Cleveland, as associate editors of *Metals Handbook*. Since 1946 Mr. Foster has been associated with the technical staff of American Foundrymen's Society, recently as editor of *AFS Transactions*. Previous associations include Dodge-Chicago Plant, Chrysler Corp., International Harvester Co., Chicago, Rock Island Arsenal, Rock Island, Ill., and Olin Industries, Western Cartridge Co., East Alton, Ill. He is a graduate of University of Illinois. Mr. Kubbs, formerly with Jeffrey Mfg. Co., Columbus, O., has been chief metallurgist there since 1955.

Albert L. Hunt and **Paul J. Bauman** have been appointed vice presidents, National Bearing Division, American Brake Shoe Co., New York. For the past year general manager of the division's St. Louis plant, Mr. Hunt will continue to be located there, in charge of manufacturing operations for the St. Louis, Meadville, Pa., and Chicago plants. Mr. Bauman, formerly general manager of the division's Meadville plant, will be responsible for industrial sales of the entire National Bearing Division. With the company since 1938, his headquarters will remain in Pittsburgh.

William S. Boonenberg has been appointed chief foundry metallurgist at the gray iron and malleable iron foundry being erected by General Motors Corp. at Sao Jose do Campos, Brazil. He joined Saginaw Malleable Iron Plant, Central Foundry Divi-

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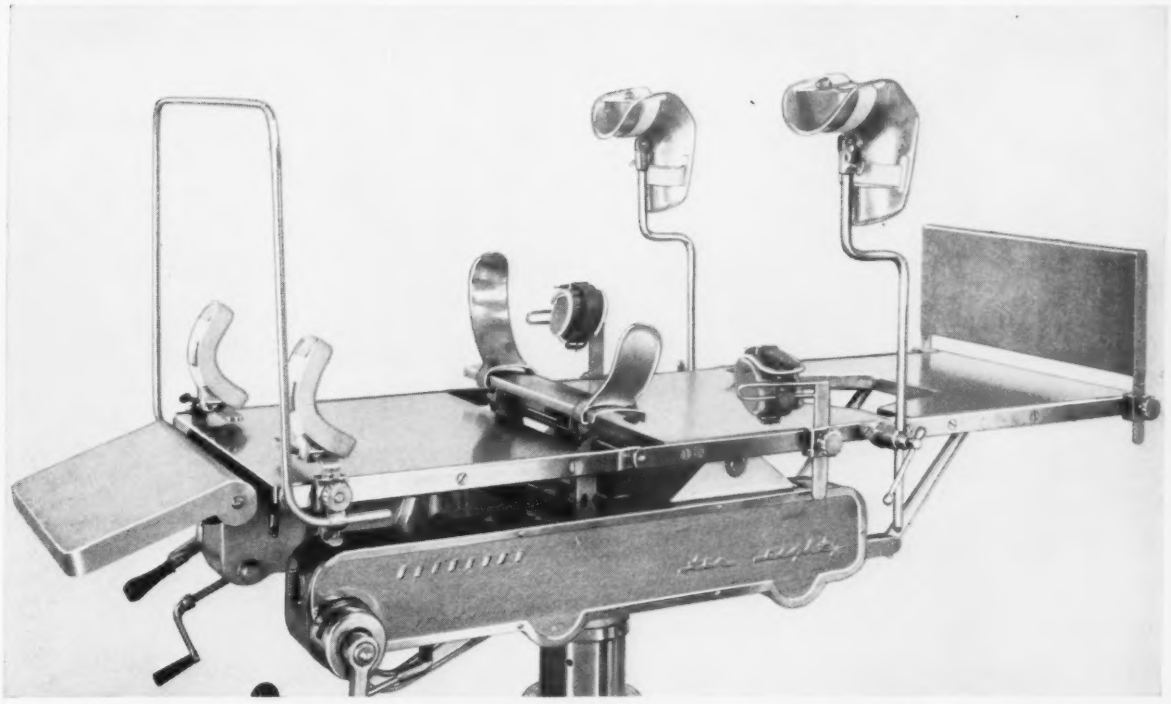

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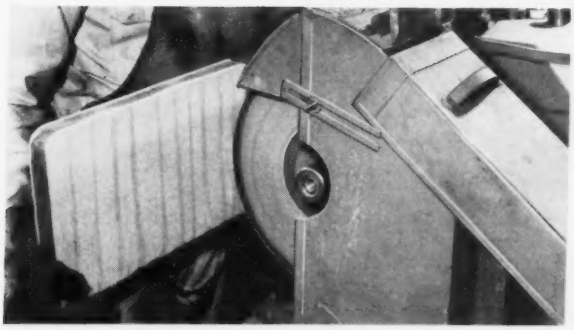

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in the Rocky Mountain area. Mr. Drake is a former chairman of

national committee work of the AFS Sand Division.

Brazil. He joined Saginaw Malleable Iron Plant, Central Foundry Divi-

MEN OF INDUSTRY

● **ARTHUR S. DOWN**
. . . joins Flick-Reedy Corp.

● **IAN K. MacGREGOR**
. . . Climax Molybdenum v. p.

● **D. F. SAWTELLE**
. . . joins Exomet Inc.

● **W. O. McFATRIDGE**
. . . Chicago Chapter pres.

sion of GMC, in 1950 and since 1952 has been general supervisor of the laboratory there.

● **Arthur S. Down** has been appointed eastern division manager, Flick-Reedy Corp., Melrose, Ill., responsible for the Miller Fluid Power Division, and Tru-Seal Division sales in the Eastern and Southern states. Mr. Down was formerly associated with Hills McCanna Co., Chicago, and Turner Brass Co., Sycamore, Ill.

● **Ian K. MacGregor** recently joined Climax Molybdenum Co., New York, as vice president-eastern operations. Since 1952 he has been general manager, Manning, Maxwell & Moore Inc., Stratford, Conn., and previously was associated with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

● **D. F. Sawtelle,** formerly chief metallurgist, Malleable Iron Fittings Co., Branford, Conn., recently joined Exomet Inc., Conneaut, O., with headquarters in Chicago. Mr. Sawtelle has been active in various technical societies, including the American Society for Metals, Steel Founders' Society, New England Foundrymen's Association, and in national committee work with the American Foundrymen's Society.

● **W. O. McFatridge,** elected president of the Chicago Chapter of the AFS for 1957-58, is supervisor, foundry research laboratories, Manufacturing Research Department, International Harvester Co., Chicago. Mr. McFatridge attended University of Michigan and studied industrial design at the Art Institute of Chicago. Since joining International Harvester as a foundry training student in 1936, he served in production and supervisory capacities at the company's automotive foundries and at the Indianapolis engine works. Prior to his transfer to manufacturing research, he was an assistant superintendent at the Farmall Works foundry of the company, Rock Island, Ill.

F. Merrill Pritchett recently joined Oak Hill Foundry & Machine Works Inc., Oak Hill, O., as sales representative and head of technical control. He was formerly associated with Globe Iron Co., Jackson, O., and Miller & Co., Cincinnati.

Ernest T. Goddard recently joined Washington Iron Works, Seattle, as traffic manager, succeeding **Lee Hewitt,** who has retired after more

FEF INTENSIFIES CAMPAIGN FOR NEW MEMBERS

L. P. ROBINSON

The need for technically trained people in the foundry industry continues to grow. Recent estimates show that the foundries' demands for engineers will increase 30 per cent between 1957 and 1960. If these needs are to be met, the program of the Foundry Educational Foundation, which has proved so effective within present limits must be expanded.

Expansion of the service which FEF provides the foundry industry depends directly upon the revenues provided through annual contributing memberships.

Realizing that increased demands will be made upon the Foundation in the years ahead, the trustees have authorized a membership campaign

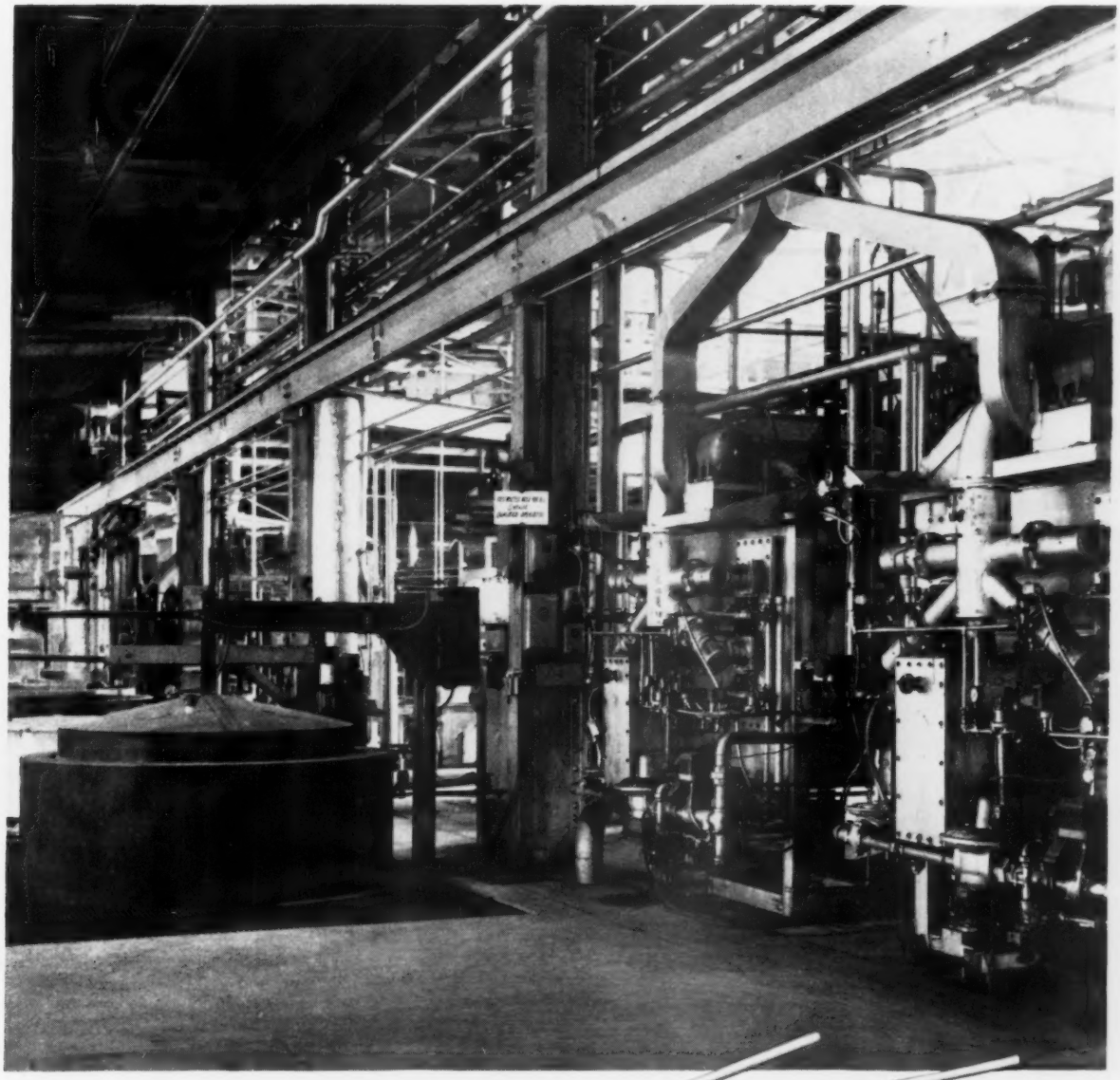
the organization. The expansion program will be under the direction of L. P. Robinson, retired vice president of the Foundry Products Division, Archer-Daniels-Midland Co., Cleveland.

Mr. Robinson has been greatly interested in the FEF since its inception, and has served as a trustee. In taking over the management of the membership campaign, he is contributing his time, effort and experience in further service to the industry.

Beginning Sept. 15, Mr. Robinson will spend some time in each of 16 major foundry areas, working with leaders in these districts to further membership in the foundation.

Starting with five schools in 1947, the Foundation now has developed into a coast-to-coast operation with 16 affiliated institutions. In recent months additional engineering colleges have made requests for affiliation, and many foundry leaders in areas not served directly by FEF schools have urged the establishment of new programs in those locations.

In addition to developing much greater interest in the foundry industry as an attractive career among engineering students, the FEF program has succeeded in telling about 6000 engineering students a year of the importance of cast metals as engineering materials. These men will bring to the consumer industries an appreciation of the advantages of



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the years ahead, the trustees have authorized a membership campaign to inaugurate the second decade of

will bring to the consumer industries an appreciation of the advantages of castings.

traffic manager, succeeding **Lee Hewitt**, who has retired after more than 45 years with the company.

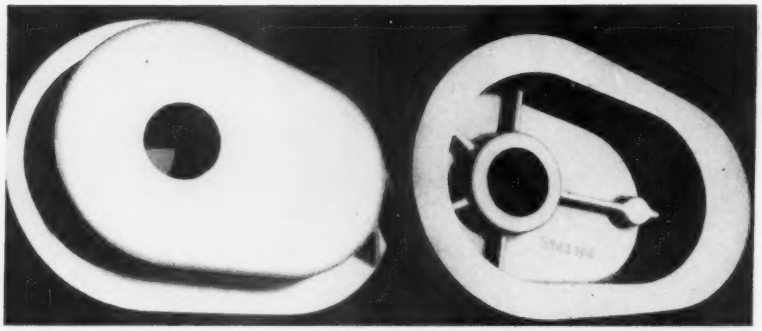


Fig. 1 and 1A—At the left are part of a mold and the pattern from which it was made. Shown above are top and bottom views of the casting produced from a completed mold at Goodyear Aircraft Corp., Akron, Ohio

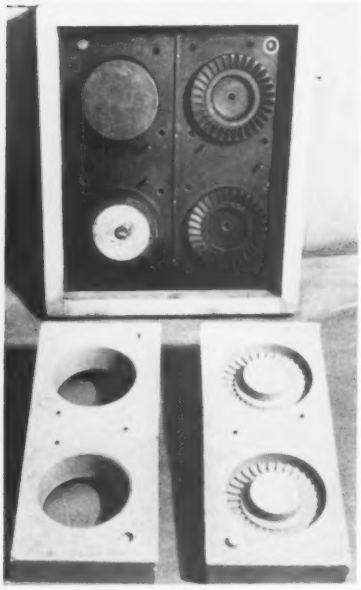
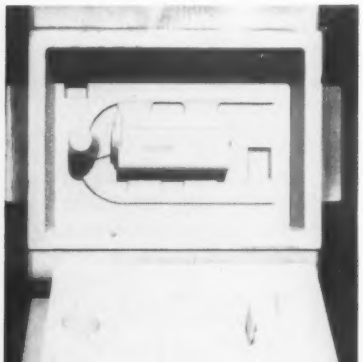


Fig. 2—Cope and drag patterns and mold halves made from them at Oklahoma Steel Castings Co., Tulsa, Okla.

Fig. 3—View of another pattern and a half-mold made from it at Goodyear Aircraft Corp., Akron



New Molding Process

Makes Close-Tolerance Castings

By JAMES W. HAMBLEN
Metallurgical Engineer
National Cylinder Gas Co.
Chicago

A RESEARCH project has been carried on for some time by National Cylinder Gas Co., Chicago, to develop a process which will combine the high casting quality of shell molding and the low production cost of sand casting. What was sought is a bridge to close the gap between ordinary sand casting and shell mold casting. The research program turned to the possibility of using a variation of the carbon dioxide process of hardening cores and molds.

Favorable results obtained in laboratory-scale foundry operations led to limited actual foundry trials and finally to full-scale foundry programs. The new semi-precision molding process now has proved satisfactory in several foundries, including that of Goodyear Aircraft Corp., Akron, O., where the CO_2 process is being used in the production of aluminum castings for aircraft in semi-precision molds.

The CO_2 core hardening process involves the use of silica sand, with grain sizes ranging from 50 to 140 AFS, mixed with sodium-silicate based binders containing small amounts of carbohydrates. The mixture is mulled, then formed into molds which subsequently are hardened by the application of carbon dioxide gas. This process produces a mold which can be handled readily without any baking. These molds are assembled in the same manner as shell molds and are poured.

In adapting the CO_2 process, which has been used to harden conventional sand cores and molds, to a semi-precision mold making method, investigators discovered that extremely thin molds cannot be made. Relatively thin molds are produced, however, and result in castings with high dimensional accuracy and in finishes with a degree of smoothness comparable to that obtained in shell molding. At the present stage of the art, it is believed that shells as thin as ½ in. are practicable. One definite advantage of the new process is its ability to handle nearly all castable metals, including low-carbon steels. Production runs on steel valves and impellers up to 60 lb at Oklahoma Steel Castings Co., Tulsa, Okla., show the process wholly suitable for such work. This firm holds tolerances of 0.010 in. per in. on highly configurated steel pieces.

Only a modest equipment investment is required to tool up for the CO_2 process. In most cases, existing core and molding equipment can be used or, if necessary, adapted at

ulating equipment, gassing heads and an inexpensive sodium silicate binder material. Many foundries already are using CO_2 to harden cores and would require no further investment.

All operations in the production of CO_2-hardened, semi-precision molds are carried on at room temperatures. Among other things, the absence of elevated temperatures permits the use of less expensive and less complex pattern equipment and eliminates the possibility of thermal distortion in patterns and molds.

Companies using the CO_2 semi-precision molding method report that excellent surface qualities are obtained on their castings. Both the CO_2 semi-precision casting process and conventional shell molding can claim as strong advantages the ability to produce parts to close dimensional tolerances. It still is difficult to give universal tolerance ranges for semi-precision casting because many factors influence dimensional accuracy, but Goodyear reports that it gets tolerances of ± 0.002 to 0.004 in. per in.

As used in the CO_2 semi-precision molding process, sand molds are not subject to heavy thermal shock by molten metal. Since the sands used in the CO_2 process have an inorganic bond, they are able to withstand high metal temperatures. There thus is little possibility of spalling, checking and erosion in the mold and, consequently, not much danger of producing castings with surface imperfections. The low-organic sodium silicate binders used in the CO_2 semi-precision molding process produce only a low volume of evolved gases.

ASTM Publishes *Proceedings*

The 1956 edition of its *Proceedings* has been published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Its 1510 pages record the activities of the society for the entire year.

Contents include a summary of the 59th annual meeting which notes the title and author of each paper presented at 32 technical sessions; reports of 80 technical committees with appendixes and 52 technical papers with discussions; and listings by titles and authors of all papers published in the ASTM *Bulletin* and of symposiums published separately as special technical bulletins. Also noted by authors and titles is material from the 41 technical sessions and 8 industry luncheons held at the group's second Pacific area meeting.

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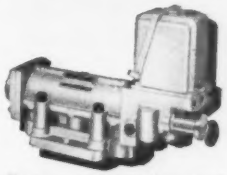

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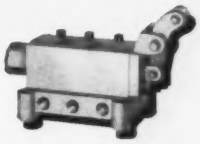

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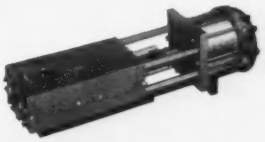

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molds which subsequently are hardened by the application of carbon dioxide. The CO_2 reacts chemically with the sodium-silicate and pro-

core and molding equipment can be used or, if necessary, adapted at small cost. The only new investment required is for a CO_2 gas supply, reg-

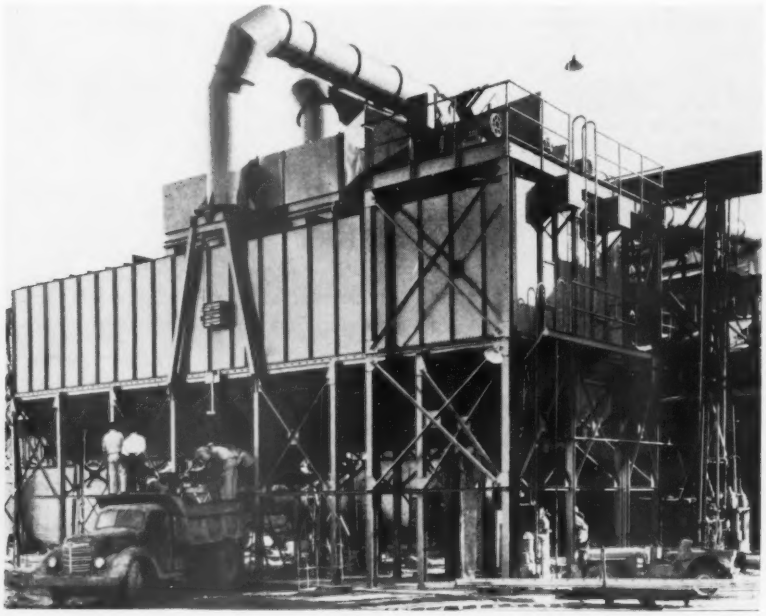
Industry Briefs

TEXAS Electric Steel Casting Co., Houston, Tex., has undertaken a major expansion program involving installation of a new 4-ton electric furnace and additional plant buildings. Approximately 20,000 sq ft of floor space is being added, including enlargement of the coreroom, an addition to the molding floor and erection of a new shipping department. The new furnace will enable the company to pour as much as 13 tons of steel at one time, and the expansion will necessitate hiring of 150 to 200 more employees.

Newaygo Engineering Co., Newaygo, Mich., will build a new plant to be used exclusively for the manufacture of foundry sand handling and conditioning equipment. The one-story building, 350 ft long, will provide for continuous flow of production and will be served by overhead cranes. The new capacity is being placed alongside the company's present plant and will permit expansion of offices and engineering department in the latter building, which also will be used for machining operations and storage.

Virginia Metalcrafters Inc., Waynesboro, Va., has purchased a large vacant building in Waynesboro and will move its brass foundry to the premises in December, after minor alterations to the facility have been completed. Plans also call for construction of a new iron foundry on the site at a later date. Meanwhile, the iron foundry will continue operations at the company's present site. Virginia Metalcrafters purchased the Harvin Co., Baltimore, about 18 months ago and has sold its physical facilities. The business now will be consolidated in Waynesboro.

Dominion Brake Shoe Co., Joliette, Canada, has acquired all physical assets and business of Manitoba Foundries & Steel Ltd., Selkirk, Canada. Manitoba Foundries becomes the sixth division of Dominion Brake Shoe, and sales activities will be integrated with those of the Joliette Steel Division. Dominion Brake Shoe is a subsidiary of American Brake Shoe Co., New York, and Manitoba Foundries was a wholly owned subsidiary of Vulcan Iron & Engineering Ltd., Winnipeg.



KNOCKS OUT AIR POLLUTION: A giant "vacuum cleaner" that uses 780 dacron bags 15 ft long and 6 in. in diam has been installed at the Torrance, Calif., plant of National Supply Co. to fight air pollution. The $125,000 system occupies a four-room building and is capable of moving 75,000 cu ft of dust-laden air from the electric melting furnace department per minute. Only clean air is

Apex Smelting Co., with plants in Chicago, Cleveland and Los Angeles, has acquired full ownership of National Metallurgical Corp., Springfield, Oreg., by purchase of the half-interest held by American Smelting & Refining Co., New York. National Metallurgical has been engaged in experimental production of aluminum silicon alloys and silicon metal. Apex states that an expansion of the Springfield facilities is contemplated.

Precision Founders Inc. has begun production of ferrous and nonferrous investment castings in a new plant, including sales and engineering offices, at 414 Hester St., San Leandro, Calif. In addition, the firm has established an office at 3312 W. Vernon St., Los Angeles. Thys Co., Sacramento, Calif., producer of steel castings, also has sales and engineering offices at the Hester St. address.

Devcon Corp., Danvers, Mass., has named four new distributors. They include Wesco Corp., Charleston, W. Va.; Tidewater Supply Co., Greensboro, N. C.; Industrial Foundry & Supply Co., Oakland, Calif.; and C. J. Hendry Co., San Francisco. Devcon also has appointed A. A. Hume, 4938 Second Ave. South, Minneapolis, to be its factory representative in North and South Dakota, Minnesota and western Wisconsin.

H. K. Porter Co., New York, has acquired Cleveland Hardware & Forging Co., Cleveland, producer of die castings, forgings and automotive and commercial hardware. It will be known as Cleveland Division, H. K. Porter Co., and Herbert E. White, former president of Cleveland Hardware, will be general manager.

American Iron & Steel Institute statistics disclose that 1957 ship-

Price of the volume is $12 per copy.

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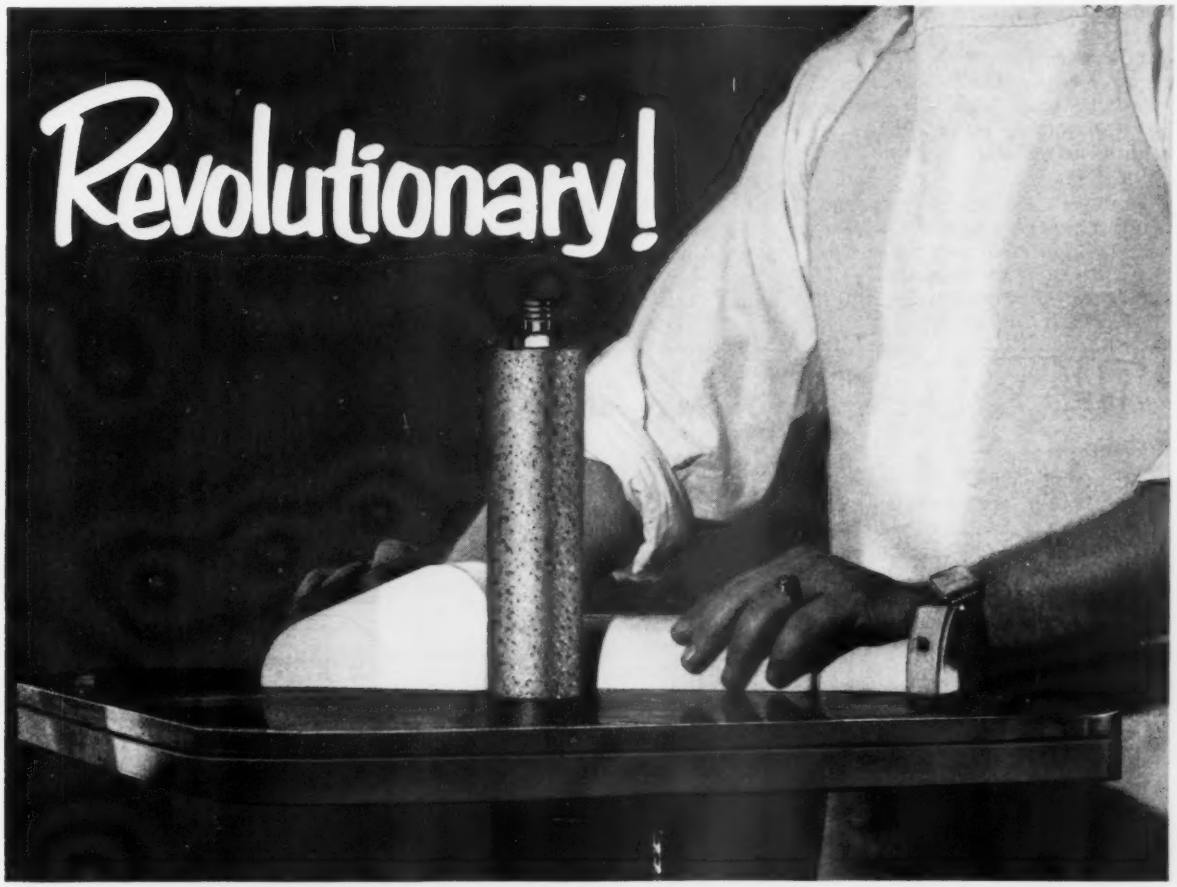

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Please send me illustrated folder on Perma-Grit Abrasive Sleeves and Rods.

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

a four-room building and is capable of moving 75,000 cu ft of dust-laden air from the electric melting furnace department per minute. Only clean air is discharged to the atmosphere. The system was designed by Dracco Corp., Cleveland, and engineered by H. J. Horrell Co., Los Angeles

riod in 1956—down from 4,427,000 tons in 1956 to 3,826,000 in 1957. June shipments were 755,000 tons, the largest for any month in nearly a year, apparently because users acquired inventories in anticipation of recent price increases.

Beryllium Corp., Reading, Pa., has dedicated its new $4½ million Nuclear Division facilities at Hazleton, Pa., and will begin operations soon. Initially, production at Hazleton will be concentrated on nuclear grade beryllium metal for use in nuclear power reactors. A contract with the Atomic Energy Commission calls for 100,000 lb of beryllium per year for a five-year period.

American Colloid Co., Chicago, with offices in the Merchandise Mart, is constructing a warehouse and office building on Grosse Point Road in Skokie, Ill., to which it will move its entire Chicago operation. Its processing plants are in Wyoming, North Dakota, South Dakota and Mississippi. The new structure, to provide 17,000 sq ft of floor space, will be ready for occupancy by next March.

ADM Acquires Federal Foundry Supply Co.

PURCHASE of the Federal Foundry Supply Co., Cleveland, by the Archer-Daniels-Midland Co., Minneapolis, has been completed.

Federal will be operated as a subsidiary of ADM and its operations integrated with the latter's Foundry Products Division, which has its headquarters at Cleveland.

Warner B. Bishop Jr., vice president and general manager of the ADM Foundry Products Division, has been elected president of Federal Foundry, succeeding Elmer Ditty, who has retired. Thomas L. Daniels, ADM president, has been named chairman of the board. Directors, in addition to Messrs. Daniels and Bishop, are Louis Heyl, who remains as executive vice president of Federal Foundry; Sims A. Adair, ADM treasurer; George K. Nelson, director of ADM's development department, and Peter Reed, Cleveland attorney.

No personnel changes are planned at the various Federal Foundry Supply plants and warehouses.

ADM, the country's largest manufacturer of core oils and also a producer of shell molding, air setting, and CO_2 setting core binders, expands its product line considerably through the acquisition of Federal. The latter produces seacoal, core washes, foundry facings, parting compounds, core and mold blowing machines, bentonite, a vermiculite, and sells a broad line of foundry supplies and equipment. In addition to its main plant in Cleveland, Federal has bentonite mines in Wyoming, a seacoal plant in West Virginia and warehouses at Chicago, Detroit, Los Angeles, Minneapolis, Milwaukee, Chattanooga, Tenn., Cranston, R. I., and Richmond, Va.

WARNER B. BISHOP JR.

Cleveland plant and offices of the Federal Foundry Supply Co.

Hooker Electrochemical Co., Niagara Falls, N.Y., has opened a district sales office at 6 Penn Center Plaza, Philadelphia. The office will serve Pennsylvania, southern New Jersey, eastern West Virginia and all states east of the Mississippi river and south of Kentucky. It also will be headquarters for Durez Plastics Division representatives.

Allis-Chalmers Mfg. Co., Milwaukee, has opened a retail branch at 4400 Archer Ave., Chicago, to provide sales, service and parts facilities on its material handling equipment in Cook, Will, DuPage and Lake counties in Illinois and in Lake county in Indiana. The branch is under the direction of the company's Buda Division.

Canam Metallurgical Sales Co. has been established by Rowland A. Tisdale and Norman F. Tisdale Jr. for the distribution and metallurgical development of ferroalloys for basic iron and steel production and other applications. Headquarters have been established in the Grant Building, Pittsburgh 19, Pa.

Electrode Division, Great Lakes Carbon Corp., has built a two-story office building addition at its Niagara Falls, N. Y., plant as another step toward its goal of a 45 per cent increase in production of graphite electrodes, anodes, mold stock and specialties.

Ferro Cast Corp., Santa Monica, Calif., an investment casting foundry, has added a sulphur and carbon analysis equipment laboratory. The laboratory is under the direction of Joseph Charbonneau, chief metallurgist.

Indiana Products Co., foundry supplier, has moved to 1611-17 South Lafayette St., South Bend, Ind., after 41 years in Kokomo, Ind. Telephone numbers are Atlantic 9-0357 and 9-0358.

Pioneer Foundry Corp., Milwaukee, is undertaking a modernization program which will involve purchase of new machinery and equipment to the extent of as much as $125,000.

Perfection Pattern & Mfg. Co., Detroit, now is located at 17141 Ryan Rd., Detroit 12, Mich.

Perma-Grit Abrasive products made only by SKIL Corporation, manufacturer of famous SKIL and SKILSAW products. Chicago 30, Illinois.

A TRADEMARK OF SKIL CORP.

CITY _____ ZONE ___ STATE _____

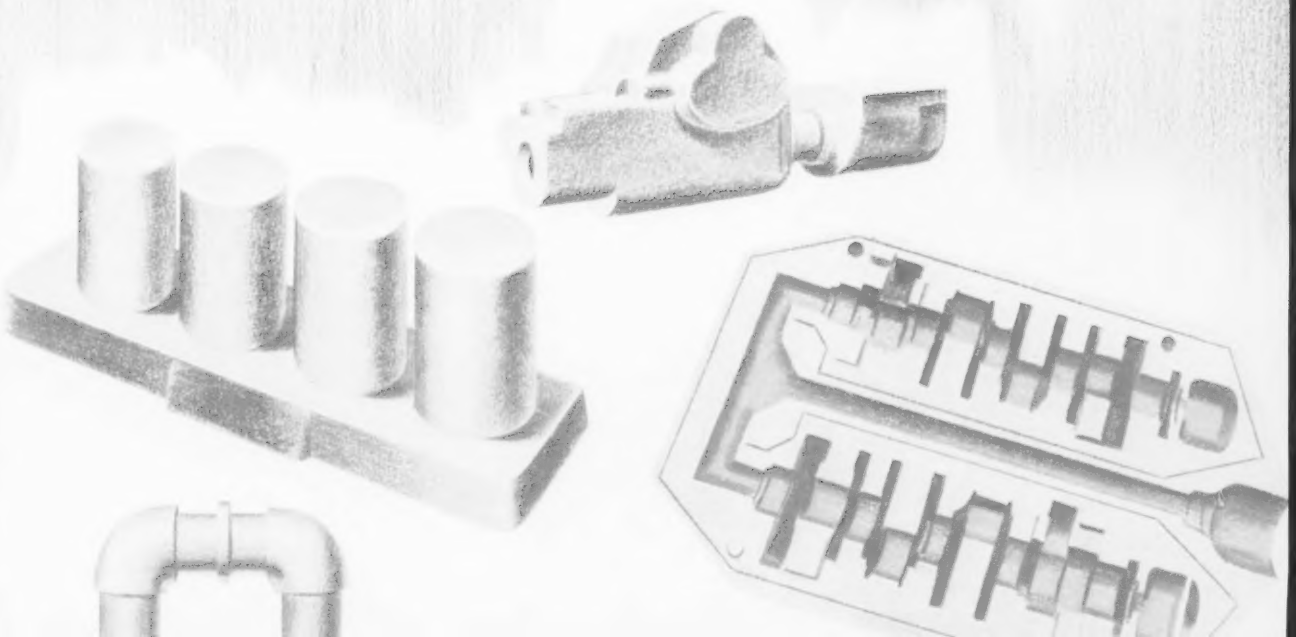
Circle 641 on Inquiry Card—Page 51

AIR-STREAM

shell molding

by

OSBORN®



Cleveland plant and offices of the Federal Foundry Supply Co.

troit, now is located at 17141 Ryan Rd., Detroit 12, Mich.

Circle 642 on Inquiry Card→

New advanced line

OSBORN SHELL MOLDING MACHINES

Multiple-station indexing units available with 2, 4, 5, or 6 stations

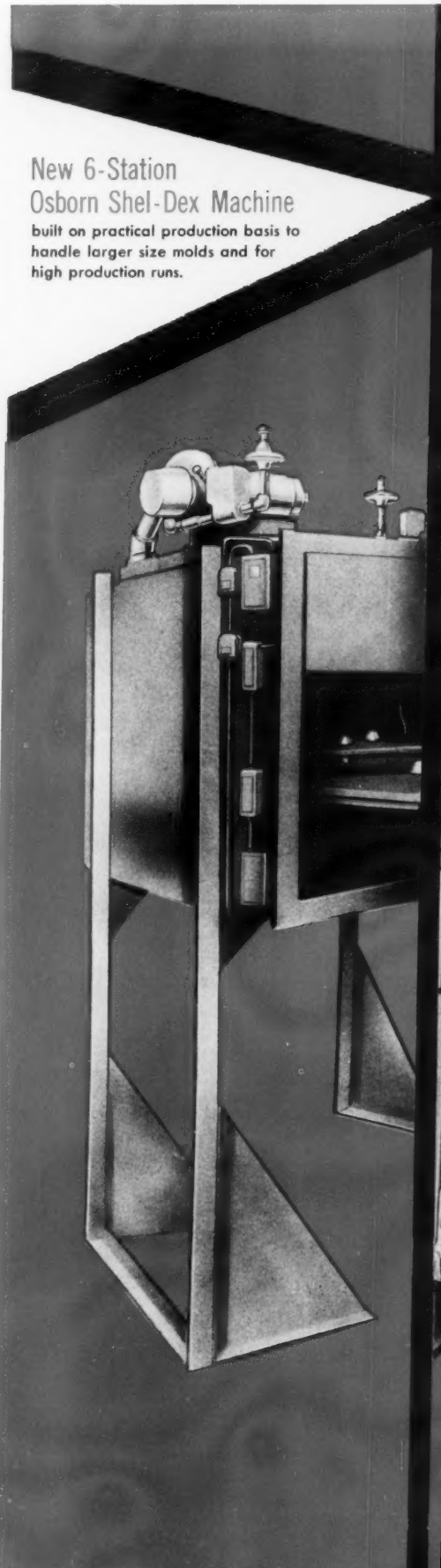
Osborn Shell Machines set new standards for top quality shell mold and shell core production

Uniform density and controlled shell thickness are accurately maintained by Osborn's air-stream blowing method for making shell molds and shell cores.

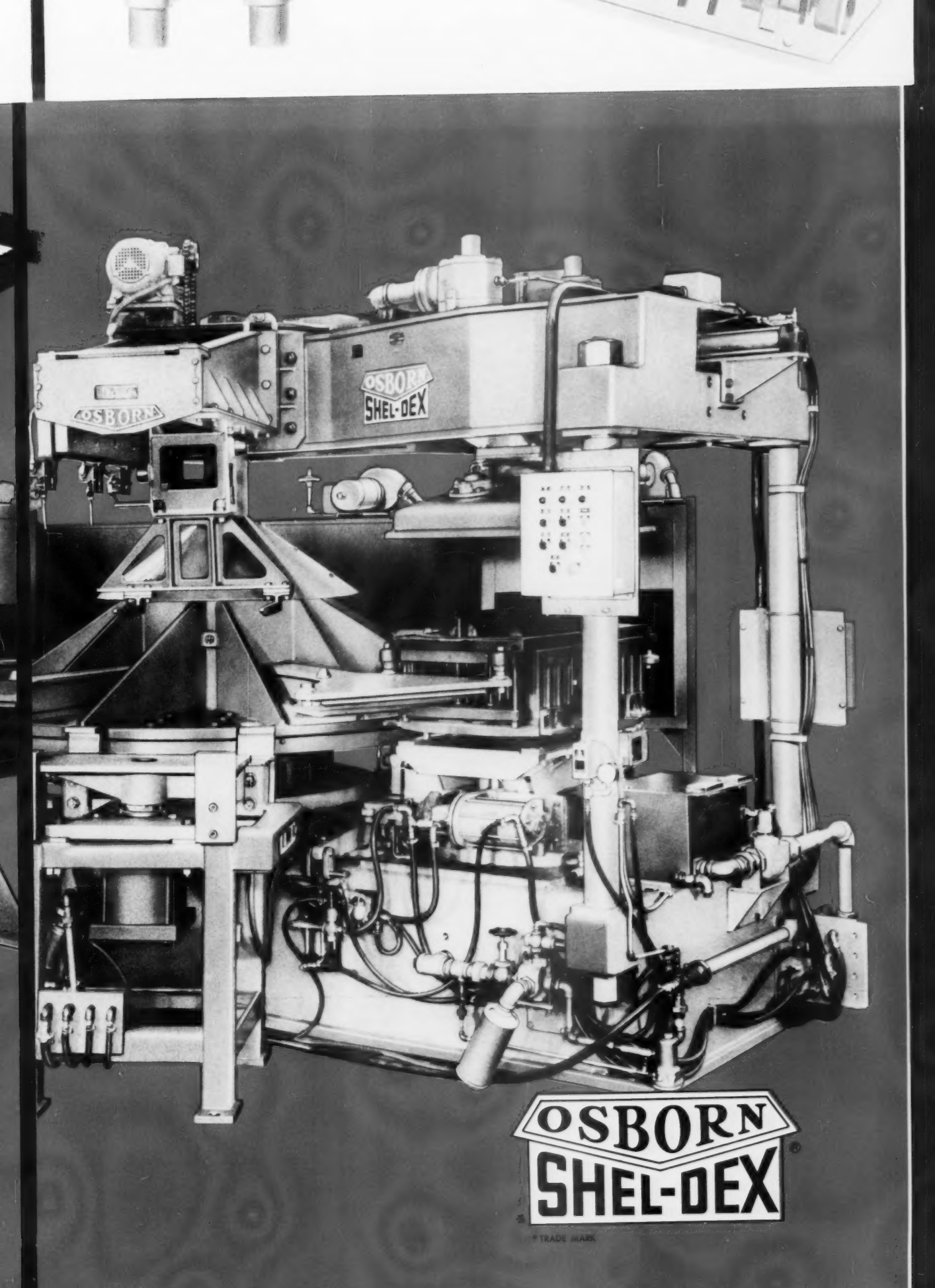
Rapid and continuous production results from automatic, pre-set time cycles. Fast, efficient stripping along with shell removal and transfer features add to productivity and efficiency.

Gas fired ovens or electrical heating elements are applicable. Curing cycle times are easily adjustable to suit specific requirements.

Write us for details. The Osborn Manufacturing Company, Cleveland 14, Ohio.



New 6-Station
Osborn Shel-Dex Machine
built on practical production basis to handle larger size molds and for high production runs.


OSBORN
SHEL-DEX
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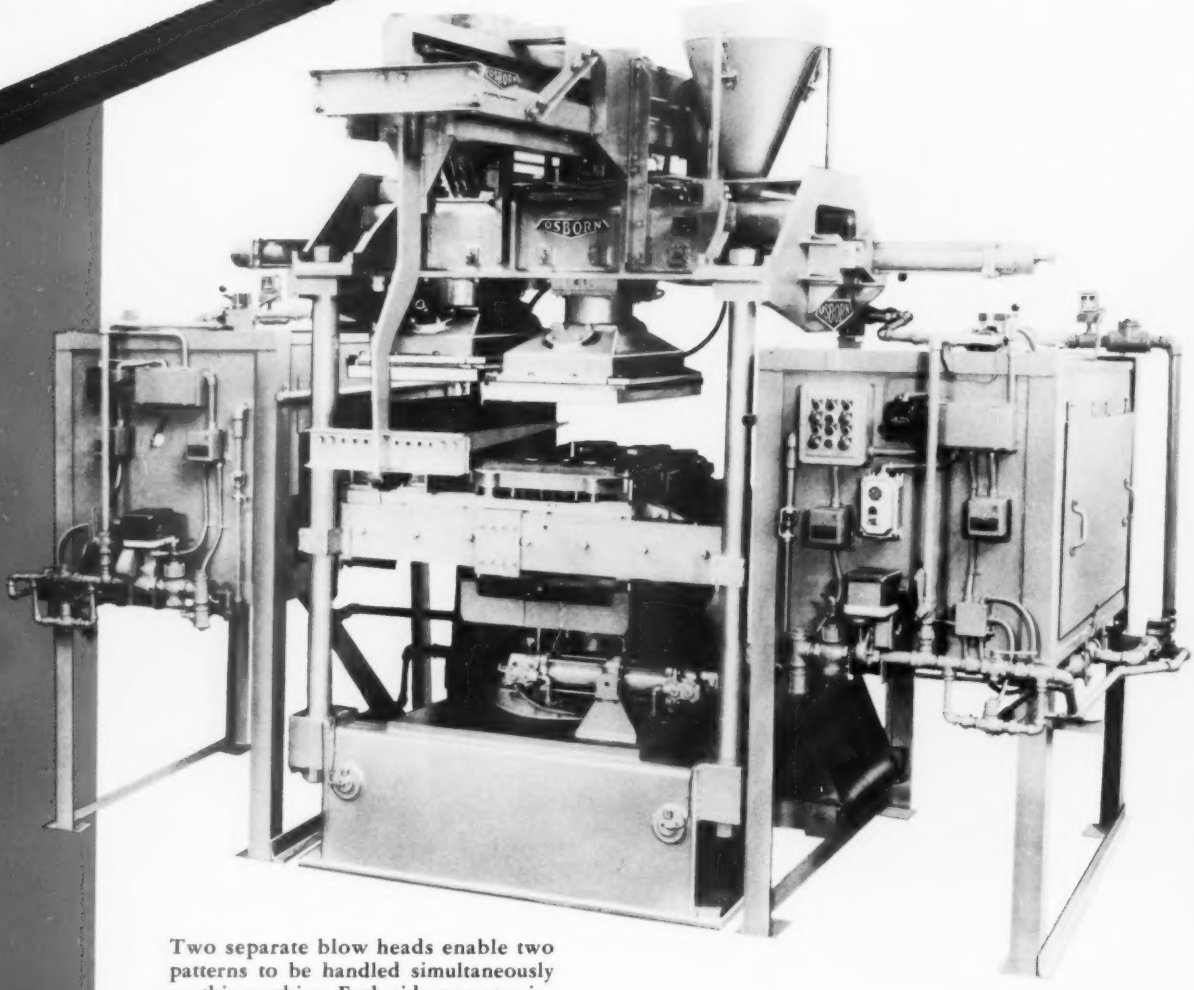
SHEL-DEX
*TRADE MARK

pany, Cleveland 14, Ohio.

New Dual-Job
Osborn Shell Machine
for fast economical operation
on shorter runs.



Two separate blow heads enable two patterns to be handled simultaneously on this machine. Each side operates independently of the other. Operating on pre-set time cycle, the machine requires only one operator who receives finished shells from shell delivery mechanism.

THE OSBORN MANUFACTURING COMPANY

Cleveland 14, Ohio

Leader in automation for the foundry OSBORN®

FOUNDRY MOLDING MACHINES • CORE BLOWERS • SHELL MOLDING MACHINES • BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • BRUSHING MACHINES

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

NEW instrument for temperature determination in use at U. S. Steel Corp. Fairless Works senses differences as small as 1° C. It can be employed 3 miles distant from the object. Developed by Baird-Atomic Inc., Cambridge, Mass., as a direct thermal-imaging device, the instrument requires no external illumination and functions in absolute darkness as well as daylight. It forms a colored two-dimensional image by utilizing the long-wave-length infrared radiation emitted from the object or area being photographed. The image is made visible by a light source within the instrument.

Heart of the instrument is the evaporograph cell containing a vacuum-enclosed, extremely thin nitrocellulose membrane blackened lightly on one side with a vaporized gold coating and exposed to an oil film on the other. The heat image focused on the blackened side of the membrane causes a variation in the thickness of the oil film on the other side and a difference in the interference color exhibited by the oil film on which the temperature measurement is based.

Minimizes Stresses

ANALYSIS of tensile test specimen and procedure indicated that inconsistent values obtained with conventional test briquets for shell molds and cores is caused largely by stress concentration attributable to the geometry of the specimen, according to a recently issued report. A new design was developed for the tensile test briquets which minimizes the concentration of stresses at the critical zone. Details are available in PB 121412, "Improvement of Sand Testing Techniques for Shell Mold and Core Sands" by Ahearn, Wallace and Quigley which may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, for $1.

Enhances Properties

IMPROVED creep resistance is imparted to nodular cast iron by additions of molybdenum and copper, according to a paper presented by Schelleng and Eash at the recent ASTM meeting. Phosphorus around 0.09 per cent also was found beneficial. A nodular iron containing 2.4 per cent Si, 3.4 per cent TC, 0.8 Mn, 0.09 P, 1 Ni, 0.6 Cu and 0.08 Mg shows outstanding creep resistance in the annealed state at 800° F. Heat treated Ni-Cu irons are subject to a mild precipitation hardening which causes strengthening at exposure around 800°F. Pearlite matrix structure was stable at 800° F during the longest test of some 6000 hr. At 1000° F the pearlite decomposed to ferrite and graphite.

Fancy Frame

REPORTED to be the largest gray iron precision cast tire mold ever made, the 10,000-lb casting shown in the accompanying illustration

forms a giant picture frame for an average-size secretary at the Medina, N.Y., foundry of Engineered Castings Division, American Brake Shoe Co. The mold with its mating half is to be used for production of 8-ft-diam tires for huge off-the-road equipment.

High Purity Iron

FOR the ninth successive year the American Iron and Steel Institute is underwriting a special high-purity iron program at Battelle Memorial Institute. As in the past there will be a continuing effort to obtain purer iron by development of better processing methods generally involving zone-melting technique. Direct zone purification of high-oxygen electrolytic iron and vacuum melting of electrolytic iron with carbon are two possible preliminary purification methods to be considered this year. According to Dr. George W. P. Rengstorff who oversees the program at Battelle, a supply of 1-lb ingots of zone-purified iron will be maintained for distribution to researchers at the direction of AISI.

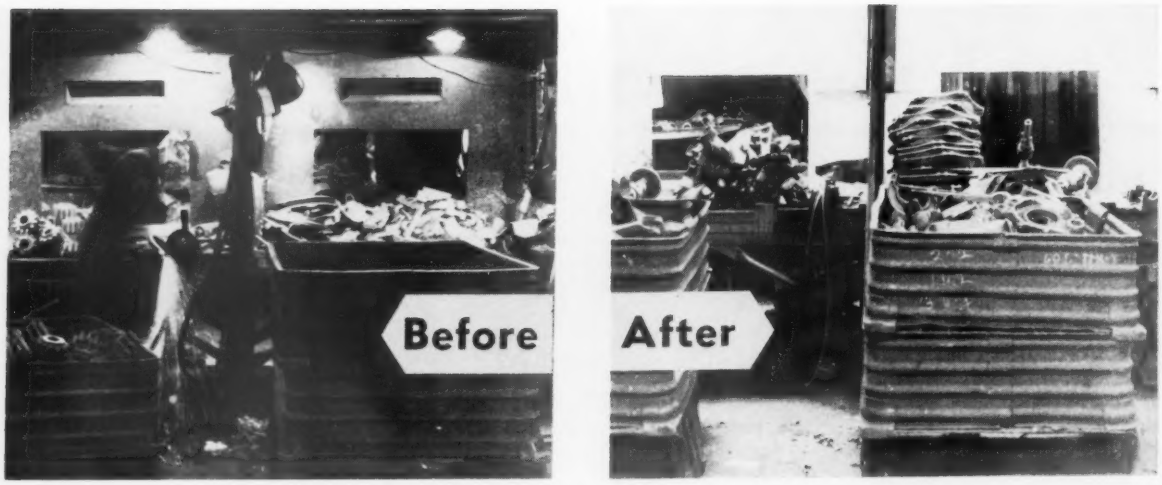
Welding Data

EIGHT catalogs of technical reports in the field of welding in the collection of the Office of Technical Services, U.S. Department of Commerce, Washington 25, are available at 10 cents each. They include: CTR-324 Welding-Part I, Steel and Nonferrous Alloys, 1932-57; CTR-325 Welding-Part II, Aluminum and Magnesium, 1943-57; CTR-326 Welding-Part III, Miscellaneous Metals, 1925-57; CTR-327 Welding-Part IV, Arc Welding; CTR-328 Welding-Part V, Resistance Welding; CTR-329-Part VI, Gas Welding, 1925-57; CTR-330 Welding-Part VII, Electrodes and Equipment, 1926-57, and CTR-331 Welding-Part VIII, General Welding Methods, 1932-57.

Worthwhile Gains

FROM time to time mention has been made of the value of removing the finer material in coke used in cupola melting. Some data to support this view were presented at an SAE panel meeting held early this year on "Modern Foundry Practice" and reported by Leonard Wood, Chevrolet-Tonawanda Foundry, General Motors Corp., Tonawanda, N. Y. In a 70-in. ID cupola the fines from 1 in. down amounted to 10.6 per cent. When the fines were reduced by screening to 1.2 per cent the necessary operating blast pressure was decreased by about 40 per cent or from 38 oz to 23 oz.

The average melting rate was increased from 24 tons to 27.5 tons per hr, or 14.6 per cent, while the maximum melting rate was increased about 11 per cent or from 27 to 30 tons per hr. A cupola with an 84-in. shell and a 17-ton-per-hr production rate had a coke-to-iron ratio of 8.6 to 1; this ratio was increased to 11.6 to 1 by installation of a 2-in. screen to remove fines.



Illustrations compare a chipping booth before and after installation of sound-absorbent material and revised lighting. Housekeeping also has been improved

Co-operative Effort Builds a SAFETY PROGRAM

By R. C. VAN HELLEN
Unitcast Corp.
Toledo, O.

SAFETY is close to the heart of both management and labor at the Unitcast Corp., Toledo, Ohio. The result is an enviable safety record in modern foundry operation.

Through the combined efforts of plant managers, supervisors, and the personnel department, an extensive safety program has been developed. Realizing that the success of any program depends on the co-operation of all concerned, it was decided to solicit volunteers from all departments who were interested in such a program.

Each supervisor was requested to submit the names of men in his respective department who he felt would take an active part. Personal letters were then written to each of the men recommended, with a complete explanation of the proposed plan.

So enthusiastic was the response that management decided to put the program into operation immediately.

The first step was to organize a fire brigade in each of the two foundries. Contact was made with the Toledo Fire Prevention Bureau in an effort to obtain an instructor qualified to conduct an extensive program in the proper use of the various types of fire extinguishers on all types of fires.

Lt. Russell Meacham offered his services, and a four-week intensive fire fighting training program was started. Actual demonstrations on oil, wood, electrical, and magnesium fires were included in the instructions.

As a result of the instructions received, management feels that Unitcast has an adequate and well equipped unit in both foundries should an emergency arise in this field.

The Toledo Fire Prevention Bureau conducted a thorough survey of the fire extinguisher equipment in all plants. Changes in the type of equipment at various places in the shops were made to conform to the suggestions in order to bring this equipment up to date and give adequate protection in all areas.

Upon completion of the suggested changes, complete layouts were made of both foundries and accurate marking of the location and type of all extinguishers was shown. All fire extinguisher areas have been marked conspicuously and numbered. No blocking of these areas is permitted under any circumstances.

In restricted areas, "No Smoking" signs have been placed in conspicuous places. To be sure that all extinguishers are in proper working order, it is the duty of Plant Protection to check the seals on all extinguishers on their rounds and make a complete "trick" report.

In order to have proper and safe traffic patterns, aisleways are marked throughout the plants. No obstructions are permitted in these

A fire brigade was organized and trained in each of the company's two foundries. Shown here are members from the Plant No. 1 group during their training

Members of the Plant No. 1 fire brigade are being instructed in the proper use of stretchers

areas and management has found more efficient handling of material and safer walking space result.

Toledo Edison Co. was called in to make a complete survey of the lighting facilities. In places where the lighting was inadequate, new installations have been made and the foot-candle rating raised to a minimum of 25-30. Readings are taken periodically to assure this level of lighting is maintained.

As a result of the interest taken in the fire brigades, it was decided that these well trained men were in a good position to become the Safety Committee. They were in the shop at all times and could bring to the attention of management many situations which could be improved and corrected in the safety campaign.

To acquaint the committee with the many problems which may develop in the plants, in the home and on the road, Unitcast contacted the American Red Cross and secured the services of two registered instructors. A complete course in first aid training was conducted, consisting of a two-hour session each week for nine weeks. Attendance at the sessions was virtually 100 per cent.

So strong was employee interest in the program that a second class was arranged for supervisors, with 35 enrolled.

The original program set up definite rules regarding the use of safety shoes, helmets, proper eye protection, respirators, leggings for pourers and those who work in the vicinity of hot metal.

Safety committees received instruction on use of artificial respiration. Paul McMahon is seen here working with the committee from Plant No. 1

Chester Coleman instructs the Plant No. 2 safety committee on first aid

The Safety Rules Committee is now at work on a new set of revised and supplemental rules. Copies of these rules will be distributed to all employes upon completion.

Compulsory use of safety shoes, respirators, helmets in certain areas, goggles and other equipment is a must throughout the shop. This regulation is being outlined completely in the new safety manual.

The program not only is aimed at men in the shop but is being channeled into the home as well through a very attractive safety calendar. Participation in this phase of the program is encouraged through a monthly jingle contest, a prize be-

Sound-absorption screens of the type shown at the left of this illustration separate chippers

effort to obtain an instructor quali-

ing awarded for the best entry.

Conspicuous signs pertaining to safety have been placed throughout the plants. As an example, "Let's All Work Safely" has been painted on the floors at all main entrances to the foundries. "Stop" signs have been placed in all areas where general traffic is heavy, resulting in more careful and safe handling of lift and other power trucks.

The program includes work on sound absorption. The firm has installed several chipping booths that are sound proofed with a combination of fiber glass and acoustical peg board. Sound absorption partitions have been placed on the floor in the chipping area.

The results are encouraging and management believes that considerable progress will be made in this field in the near future. We recognize that sound cannot be entirely eliminated in the foundry, but through this experimental program we feel that considerable absorption can be accomplished.

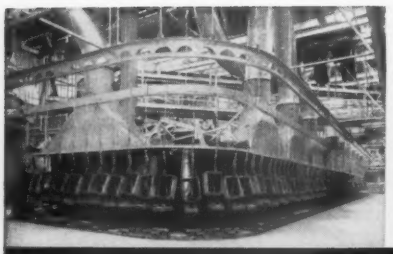
Safety and health articles are a monthly feature of the "Unitcaster" publication. These articles are prepared by the firm's full-time registered nurses and have generated wide interest and comment among employees.

All workers are encouraged to participate in the annual safety campaigns as conducted under auspices of the Toledo Industrial Safety Council. The classes and lectures have been well attended by representatives of all departments.

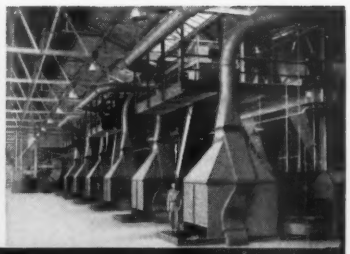
Unitcast Corp. was one of the first companies of its size to participate 100 per cent in the Regional Blood Center under direction of the Toledo Chapter, American Red Cross.

Unitcast apparently has found a solution to the numerous problems

"I've got a reputation as the safest driver in the plant—"



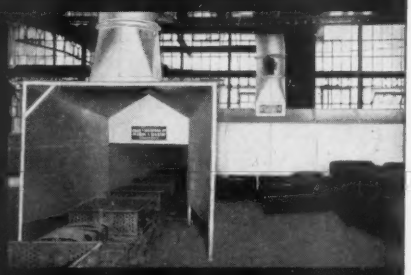
View in new Southern Foundry, shows pouring station with K & B system which removes smoke and fumes as they are formed.



"Shakeouts" in the foundry of a noted implement firm equipped with K & B Dust Control System.

1. DESIGN
2. FABRICATION
3. INSTALLATION

For all three . . . call K & B



K & B Plenum Chamber Hood for mold conveyor operation. Note bolted section construction for ease of maintenance.

For 50 years, Kirk & Blum has specialized in the DESIGN, FABRICATION and INSTALLATION of efficient, dependable systems for the removal of dust and fumes.

DESIGN: Kirk & Blum engineering specialists survey your plant and then design your system, selecting equipment most suitable for your problem.

CONSTRUCTION: Kirk & Blum fabricates the complete system (equipment excepted), "tailor made" for your installation.

INSTALLATION: The Kirk & Blum contract includes responsibility for the entire system, installed by mechanics with years of specialized experience in the installation of such systems. As a result, you have one undivided responsibility—one complete contract for an installed system, ready to operate.

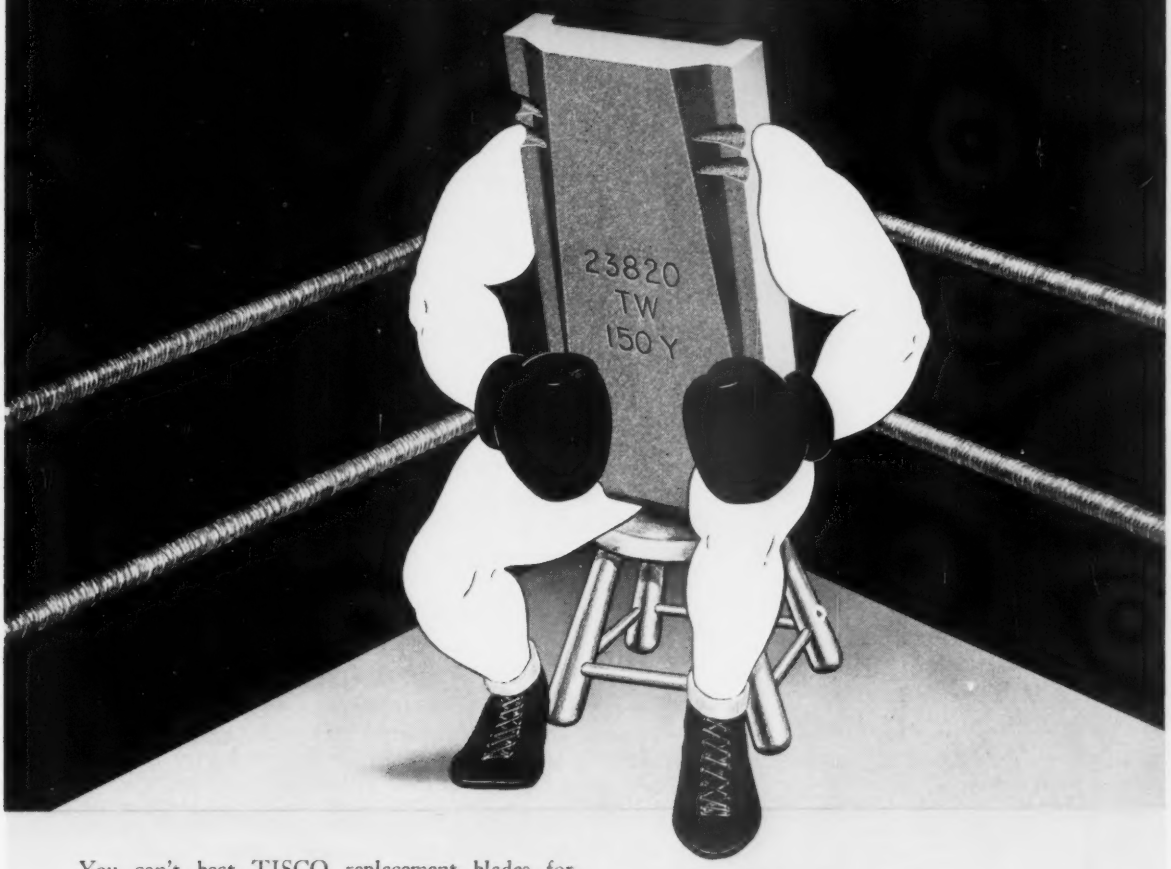
FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK & BLUM

DUST AND FUME CONTROL SYSTEMS

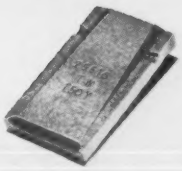
The Kirk & Blum Mfg. Company, 3239 Forrer Street, Cincinnati 9, Ohio

World's Champ the TISCO® Kid



You can't beat TISCO replacement blades for long-wearing, trouble-free service. TISCO blades knock out wear and down-time with one profit-packing punch, because TISCO outlasts competitive blades 6 to 1! Harder, thicker TISCO replacement blades for Wheelabrators* are accurately ground for easy replacement, another cost-saving feature. Decide now to cut your costs—specify TISCO 150-Y High Chrome Alloy replacement blades for extreme abrasion.

*Reg. U. S. Pat. Off. by Wheelabrator Corporation



TISCO Replacement Blade — Manufacturers part numbers 36473 and 154069.

TISCO Replacement Blade — Manufacturers part numbers 47130 and 143600.

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PLANTS: Cincinnati, O. — Birmingham, Ala. — Easton, Pa.
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IT'S UP TO YOU!

The students who are interested in the foundry industry today are the industry's management of tomorrow.

One of our jobs, as the Foundry Educational Foundation, is the encouragement of, and assistance to, these students.

Over the past nine years, as you can see from the accompanying chart, F.E.F. has made great strides in that direction. Sixty-four departments now require students to study the cast metals industry, as compared to only twenty in 1947.

This advancing trend will assure a continuing flow of capable, well-educated young men into our industry . . . **providing** your interest and financial support are maintained now and in the future.

DEPARTMENTS REQUIRING CAST METALS STUDY

Write for our new booklet, "Let's Look Ahead".

You'll be glad you did.

Foundry Educational Foundation

1138 TERMINAL TOWER BUILDING • CLEVELAND 13, OHIO

The Foundry Educational Foundation does not pay for this advertising. This space has been contributed by FOUNDRY magazine in support of FEF's constructive program for foundry industry progress through education.

confronting a company trying to "put over" a safety program. We feel the participation of the employees themselves will keep the present interest alive and by the same token will make them conscious of the great benefits which all will realize through successful operation of the program.

Will Hold Clinic on Cutting Material Costs in Foundries

The first in a series of practical training clinics designed to help metalworking industry executives reduce material costs has been announced by Metallurgical Associates Inc., New York. The first clinic is called "Getting the Most for Your Casting Dollar" and will be held Sept. 23-26 at the Sheraton-Plaza Hotel, Boston. It will deal specifically with gray and nodular irons. Authorities in these fields will conduct the courses.

Prof. Howard F. Taylor, Massachusetts Institute of Technology, will give the opening address and will join a panel to discuss actual shop problems of the men in attendance. Homer Northrup, International Nickel Co., New York, will discuss the basic metallurgy of nodular iron. Others who will conduct discussions and be a member of the panel include Charles Walton, Gray Iron Founders' Society; Al Steck, formerly of General Electric Co.; Carl Morken, Kennedy Valve Mfg. Co., and many more.

Information regarding the program and registration material can be procured from Harold Brown, program director, Metallurgical Associates Inc., 30 Rockefeller Plaza, New York 20, N. Y.

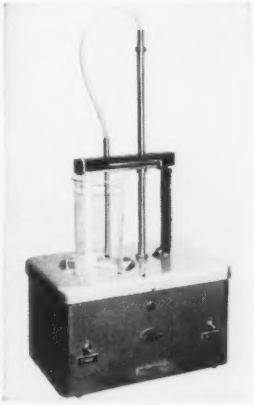
Die Caster Wins Safety Award

Nineteen months and 1 million manhours of plant operation without a disabling injury have won a safety award for Madison-Kipp Corp., Madison, Wis., producer of die castings. The accident-free safety record began on Sept. 17, 1955, and has not been broken, although the award covers only the period through April 10, 1957, when the million manhours of safe operations was concluded. The company has more than 300 employees.

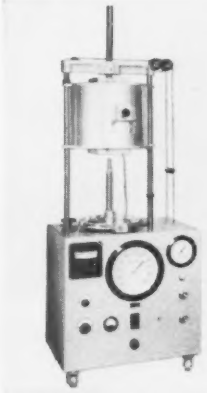
A plaque was awarded Madison-Kipp by American Motorists Insurance Co., a division of the Kemper Insurance Group, Chicago. Kemper is represented in Wisconsin by Lumbermens and Manufacturers Mutuals of Wisconsin.

ENJOY THE BETTER THINGS OF LIFE

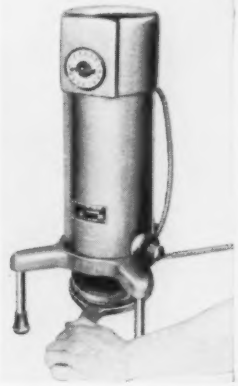
Why overwork yourself? Dietert-Detroit Sand Control Units can help you PRODUCE *BETTER CASTINGS* AT *LOWER COSTS* IN *LESS TIME*.



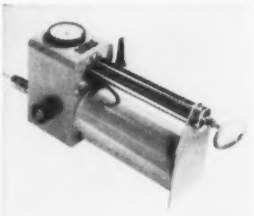
AUTOCLAY . . . No. 513
Saves operator's time in running A.F.S. clay substance test. Better castings and easier molding result from sands with controlled clay content.
To obtain better casting finish, improve sand grain distribution, control fineness.



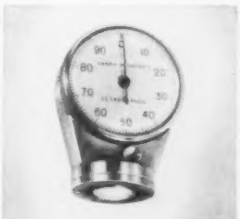
THERMOLAB . . . No. 785
For clean castings, free of defects. Test and control the high temperature properties of your molding materials with the Dietert-Detroit Thermolab. Reduce or eliminate scabs, cuts, etc.



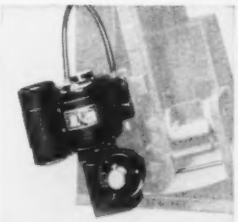
MOISTURE TELLER . . . No. 276
Control moisture content in your molding sands and you will control the greatest variable causing defects in any foundry. The No. 276 takes but a few minutes to check moisture content.



RAGONE . . . No. 4210
Measure fluidity of ferrous and nonferrous metals in seconds. Take the guess-work out of pouring requirements—know when your metal will flow properly to fill the mold.



MOLD HARDNESS TESTER . . . No. 473
Molds too soft? Rough surface can result. Molds rammed too hard? You may get rat-tailed or buckled castings. Be sure your molds are properly rammed, use the No. 473 Hardness Tester.



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HARRY W. DIETERT COMPANY
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New "SPUR-ACTION" abrasive belt cuts 25% Faster.

Removing excess material from a cast brass spring housing for a pressure reducing valve is fast and easy with a new "81-Coat" Resinall Metalite abrasive belt. The new Behr-Manning abrasive belts not only do a faster stock removal job but also stand up longer than any previously used.

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Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"Common sense should make it clear that too much time spent looking for ideal conditions to prove our genius can be pretty much wasted"

Journeying Journeymen

SOMETIMES it seems to me that foundrymen change jobs more often than folks in other crafts and trades. Maybe it's just my imagination, for I have no statistics. During this past year I've run across three or four promising young foundrymen I thought were set for life who had made several shifts in jobs since I last saw or heard of them.

Then, too, I know any number of oldtimers who have left a zigzag trail moving from job to job all over this country and even to others. You never know when or where they'll pop up next, either upgraded or downgraded.

Old Grandpa Lee (that's my molder Grandpappy on my Pa's side) flitted about considerably, I've been told. In fact as young as I was at the time, I can remember four moves his family made in a period of what couldn't have been more than ten years.

For a long time I just took for granted that this ants-in-the-pants-ism was the reason for calling molders who had served their apprenticeship journeymen, but going to the dictionary—just yesterday, in fact—I discovered that journeyman means "Formerly, a man hired to work by the day, now, commonly, a worker who has learned a craft or a trade." *Jour* in journeyman was French for *day*.

Well, anyway, I can't imagine a more dismal picture than that of an old foundryman nearing the end of the trail who looks back on a lifetime of moving from post to pillar looking for the ideal job he never found. What makes it so tragic is that there is no such animal as an Ideal Job.

There seems to be one school of thought which holds that any graduate, from college or apprenticeship, should get as wide a variety of experience before he settles down as he possibly can—that is, before some gal snares him. Theoretically at least, it's hard to quarrel too much with this thinking.

Then there seems to be another line of thought—that after all of his schooling and training, a fellow for his own good shouldn't snap up the first job that comes his way, but should browse around considerably, probe the market for the highest bidders or, through trial and error, move from job to job until the very best bargain turns up. There seems to be a certain amount of logic to this scheme, too.

Now, making a career of building a career is all well and good up to a certain point, it seems to me, but if the lives of outstandingly successful people count for anything, the day must come when career building has to give way to a singleminded and wholehearted building of a professional reputation. After a certain amount of flirting and courting, there has to be sort of a lasting wedding, a for better or worse, 'til death do us part sort of thing in which we take the job we've got as though it's the only one we'll ever get.

Grandpa was an itinerant molder

I've made it a hobby for many years to collect examples of outstandingly successful people in the foundry business and in other businesses as well. From a careful examination of each specimen, I haven't the slightest doubt that the vast majority became so thoroughly wrapped up in learning their jobs and digging up the solutions to the problems uncovered by doing the job that they forgot all about the careers they had started out to build.

Sure, there are good places to work and some not so good, but usually more that are good. Time has a way of shucking off the not so good. But I don't think it takes such a sizable chunk of genius to riddle one out from the other.

Then, there are good personalities to work with and some not so good, but experience proves that the proportion represented by one to the other remains fairly constant, almost to a decimal point, throughout the width and length of the land of the free and the brave.

Then, again, we'd be blind if we didn't recognize that there are such things as internal politics, applepolishing and family connections. But usually, on close inspection, such intriguing is found to involve those who can't stand on their own professional feet, don't count for too much on the long haul and don't last very long. This minority is practically constant wherever we go.

So if these observations really have

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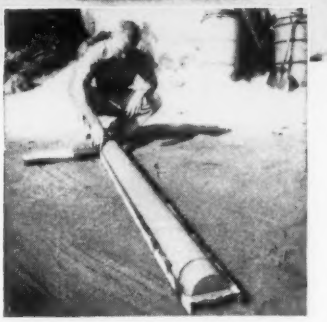


Particularly Difficult Core forms downspout for building drainage. "Thanks to excellent dry strength of Cities Service Delco #936 Core Oil, we never have problems," says Dallas.

Pipe This! Dallas Foundry makes thousands of castings for water pipes. Same Cities Service Core Oil—Delco #936—is used to make cores for these as for small cores in main illustration above.

"One core oil for all whether big or small"

All jobs go to Cities Service Delco #936 at Dallas Foundry, Dallas, Texas

Well known for its municipal, industrial, and structural castings, Dallas Foundry's daily tonnage runs about 20-25 tons.

Yet while its castings are by no means the same, its core oil is always the same . . . Cities Service Delco #936.

"This one oil does all our jobs perfectly and eliminates error of application and storage problems often encountered with several oils," says Vice President R. G. Whittington.

"Excellent service has further reduced storage. Sometimes we're able to stock only one barrel of Delco #936, knowing that we can have an order delivered by Cities Service in six hours or less."

Mr. Whittington has added his voice to the growing number of foundrymen who report outstanding service, quality, and range of application with Cities Service Delco Core Oils.

If you'd like the full story of these unique core oils along with a recommendation of which is best for you, talk with a Cities Service Lubrication Engineer. There's no obligation. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

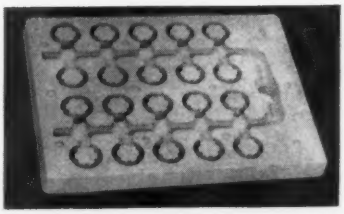
Circle 648 on Inquiry Card—Page 51

MOROC

A CONTROLLED SILICATE CO_2 BINDER

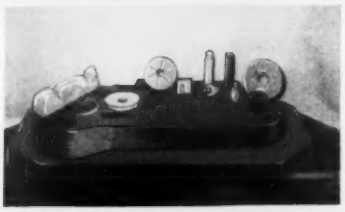
. . . . . used successfully in foundries everywhere in:

1-SHELL MOLDING



The William Powell Co., Cincinnati, Ohio, produces shell molds bonded with MOROC SILICATE BINDER. Unretouched photo shows smooth surfaces, sharp edges on typical Powell shell mold. This company uses MOROC regularly.

2-SMALL CORES



These small to medium cores made at the Swayne, Robinson & Co., Richmond, Indiana, were made with MOROC SILICATE BINDER in regular production. Picture shows that even the smallest core remains firm.

3-LARGE CORES

Illustration shows a remarkably heavy "Moroc-made" core at the Roots-Connersville Blower Corp., Connersville, Ind. A subsidiary of Dresser Industries, Dallas, Texas. They recently became a regular user of MOROC SILICATE BINDER.

4-LADLE LINING

Ladles at the Master Electric Co., Dayton, Ohio, presented quite a problem before the company turned to MOROC SILICATE BINDER. Now a regular user of MOROC, the Master Electric Co. reports that its ladle problems have been reduced and that satisfactory results have been obtained lining the ladles with a lining bonded with MOROC.

There is a controlled grade of MOROC for every foundry operation involving the use of sand and clay, and we can suggest the right grade for *your* requirements. The "case histories" mentioned above are regular (not special) production procedures! May we tell you more about MOROC and its application in your foundry?

F.O.B. POINTS: CINCINNATI, OHIO; DALLAS, TEXAS; JERSEY CITY, NEW JERSEY; EMERYVILLE, CALIFORNIA

MOROC is distributed exclusively by the Delhi Sand Co.; and produced by the Diamond Alkali Co.

THE DELHI FOUNDRY SAND CO.

Miners and shippers of all grades of fluorspar. Complete line of foundry sands, clays and bentonites

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substance (I wish I were as sure of many other things), then just plain common horse sense should make it clear that too much time spent in looking for the ideal conditions we feel we need to prove our genius can be pretty much wasted. Not only that, but career concern at the expense of job concern frequently gives the less talented, less experienced individual considerable advantage over the eager beaver when juicy promotions and recognition are being allotted. Internal politics usually is attributed to this kettle of fish.

But the more I think of it, I wouldn't be a bit surprised to find that the principal reason for the migratory career builders and prospectors was their failure to recognize the vital importance of time as a factor.

It takes time to get acquainted with a job and with an organization. And just as important, or more so, it takes time for an organization to get acquainted with an individual. No matter what a fellow says he can do, what he has done or the tunes influential outsiders have sung in his praise, only time on the new job will tell.

There has to be a proving ground to provide all sorts of emergencies and combinations of circumstances, both favorable and unfavorable, involving things and people. There doesn't seem to be any shortcut, and blazing, skyrocket careers ending with the dull thud of the burned-out stick seem to prove the point.

So what? Just this—take a job with a good organization, carefully selected, on a thoroughly understood basis and equitable terms. Then, for all intent and purposes give it the works, no matter what it is or where you rank in it. Do that job the best you know how to do it, learning all the time, so that when each assignment is finished it will be worthy of your name and the professional reputation you hope to build.

Experience proves that any one who follows this elementary recipe will not have time to worry about competition, internal politics or apple-polishing. There will be no need, for folks of this kind are rare, with the demand far exceeding the supply.

The log of any career, including time frequency change and distance traveled will tell at a glance how nearly these specifications have been met. I'll have to admit that all of this must sound rather platitudinous, somewhat pollyannaish and paternalistic, but doggone it, it's the truth, and it's a shame so many ulcers have to develop in ignorance of it. I find them in all stages of development. So I just had to write this article.

Magnesium Association Elects Officers at Annual Meeting

New officers of the Magnesium Association were elected at the group's annual meeting at Hot Springs, Va., recently. Philip B. Craighead, president, Magnesium Products, Milwaukee, was elected president. Vice presidents are Otis E. Grant, Magnode Products Inc., Trenton, O., and John Thomson, Dominion Magnesium Ltd., Toronto, Ont. James V. Cosman, Superior Bearing Bronze Co., Moonachie, N. J., was renamed treasurer.

More than 50 executives of major magnesium producing and fabricating firms in the United States and Canada discussed the outlook for the year ahead. The likely effect of current trends in both military and commercial markets was evaluated. Continued growth of the industry at the rate it has had since World War II is anticipated.

A slate of 15 directors was elected for the year ahead, including R. D. Ferguson, Bendix Foundries, Teterboro, N. J.; J. B. Heisler, A. C. Williams Co., Ravenna, O.; C. A. Howe, Hills-McCanna Co., Chicago, and W. H. Osborne, Acme Aluminum Foundry Co., Chicago.

HOW TO DO IT

Fiber Tray with Hole in Bottom Catches Boring for Analysis

By H. J. GERBER
Assistant Professor
Oklahoma Agricultural & Mechanical College
Stillwater, Okla.

COMMON PRACTICE in many steel, iron and nonferrous foundries is to drill test castings or coupons to obtain chips for chemical analysis and melt control. Illustrated here is a method used by one foundry to collect such borings without risk of contamination and with a minimum of trouble.

A shallow fiber tray is laid on the test casting from which borings are to be obtained. In the bottom of the tray is a hole of the same size as the drill used to make the borings. When in use, the tray surrounds the drill and collects the chips so they can be emptied easily into properly marked envelopes for transmission to the laboratory.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

VIBRATING CONVEYORS

—Their Operation and Use

By JOHN CHAHBANDOUR
Assistant Sales Manager
Carrier Conveyor Corp., Louisville, Ky.

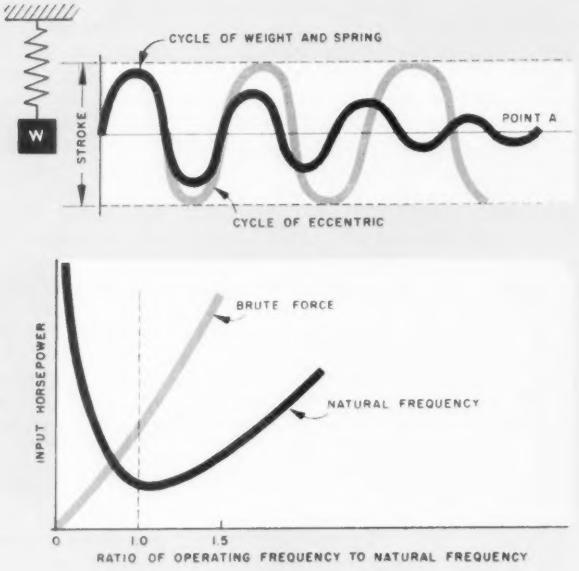


Fig. 1 (top)—Graphical representation of stopping cycle shows out-of-phase motions between eccentric and trough. Fig. 2 (below)—Chart shows comparison of input horsepower between natural frequency and brute force conveyors

ALTHOUGH foundries have used vibrating conveyors for many years, they have won general acceptance only during the last ten years. This discussion of the various types of vibrating conveyors and the drives used to power them is offered to assist in the selection and satisfactory operation of such equipment.

Types of Vibrating Conveyors—Very simply, a vibrating conveyor is a metal trough mounted on flexible supports so that the trough is free to move in a vertical plane, vibrated by a drive through a small alternating stroke at an angle of approximately 30 degrees to the horizontal. The rapid reciprocating motion causes material in the trough to move forward in series of "pitches and catches."

By its very nature, the vibrating conveyor is a simple machine which has these inherent advantages:

1. *Prevention of Spillage*—Because of highside construction of troughs, spillage can be easily controlled.
2. *Impact and Abrasion Resistance*—The heavy metal trough resists abrasive wear and impact.
3. *High-Temperature Construction*—Vibrating conveyors can be designed and constructed to handle red hot castings continuously at temperatures exceeding 1500°F.
4. *Dustproof Construction* — The trough may be covered easily to control dust.
5. *Combination Operations*—Screening, cooling and casting rollover operations are all possible during conveying.

Fig. 3—Natural frequency conveyor 95 ft long contains 114 stiff coil springs, used to store energy

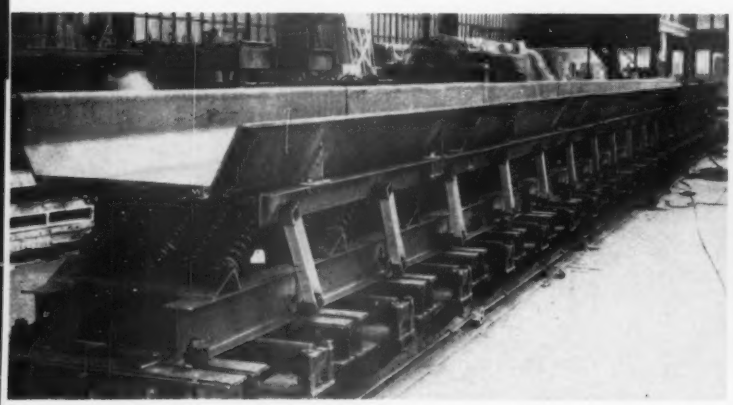


Fig. 4—Vibrating conveyor dumps two molds which weigh about 3500 lb and are at 700° F temperature

Fig. 5—Castings and sand are separated easily by the use of a grizzly deck in a vibrating conveyor

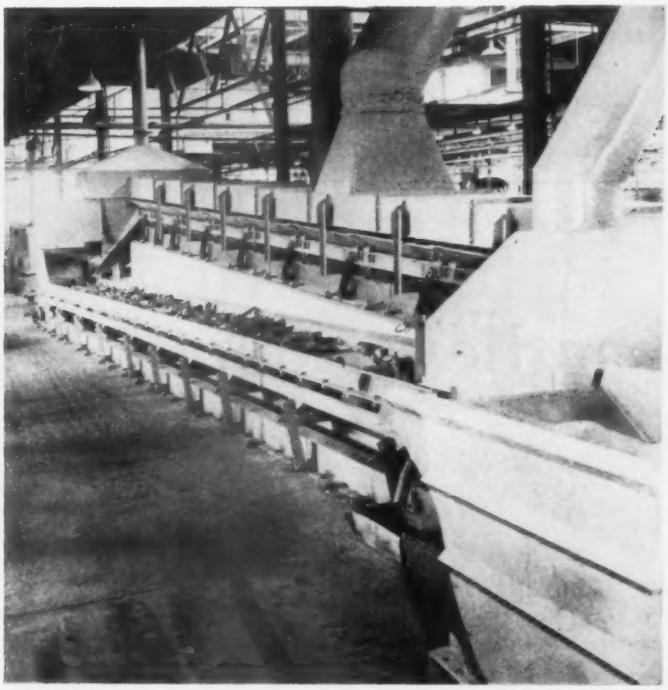


Fig. 6—Castings are conveyed across a grizzly deck or perforated plate and cooled by induced air draft

Despite the large number of firms manufacturing this type of conveyor, there are basically only two different kinds of vibrating conveyors—brute force and natural frequency types. The brute force conveyor trough is supported by rocker arms or rods pivoted at the trough and at the base connection. The natural frequency conveyor is supported by heavy-duty, stiff, coil springs.

To convey material on either type, it is necessary only to vibrate the trough. The difference between the natural frequency vibrating conveyor and a brute force conveyor is energy input. Both types require high starting energy. This input energy or horsepower remains high on a brute force machine, but a natural frequency conveyor in operation usually requires less than 50 per cent of starting horsepower to stay in motion.

The comparison of input horsepower required by natural frequency and brute force conveyors is shown in Fig. 2. Notice that operating horsepower of the natural frequency machine is lowest when the operating rpm of the eccentric exactly matches the design natural frequency of the trough weight and coil spring system.

Conveyor Drives—Although there are only two types of conveyor, three basic types of drive are used: 1. The nonpositive rotating weight. 2. The positive eccentric. 3. Positive eccentric with flexible link.

The rotating weight and the positive eccentric drive are used on brute

Fig. 7—Castings are air quenched quickly on dual vibrating unit, deck of which is a grizzly screen

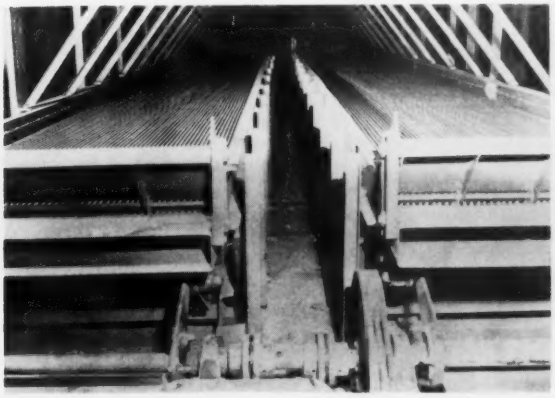
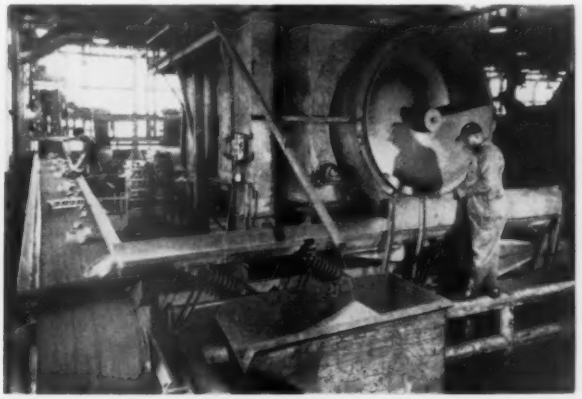


Fig. 8—Hot, cleaned castings are discharged from a blast cleaning machine to a vibrating conveyor



force conveyors, but neither can be used successfully on a natural frequency conveyor.

The rotating weight type of drive is simply a single rotating weight mounted on the trough of the conveyor. The centrifugal force set up by the weight vibrates the flexibly supported trough in a vertical plane. Restrictor devices such as weak leaf springs keep the trough vibrating along a line at roughly 30 degrees to the horizontal. Another type of rotating weight uses two opposite turning weights geared together. Whenever the weights pass each other, the trough moves in that direction. At other parts of the cycle, each weight cancels out the reaction of the other so that no trough restrictor devices are required.

The positive eccentric drive uses an eccentric shaft mounted on the base of the conveyor, under the trough. A drive arm or link of fixed length connects the eccentric to the trough. Rotation of the eccentric imparts a reciprocating motion to the trough.

Drive Involves Problems

Driving a natural frequency conveyor involves several problems which arise from the use of the large, stiff, energy storing coil springs as trough supports.

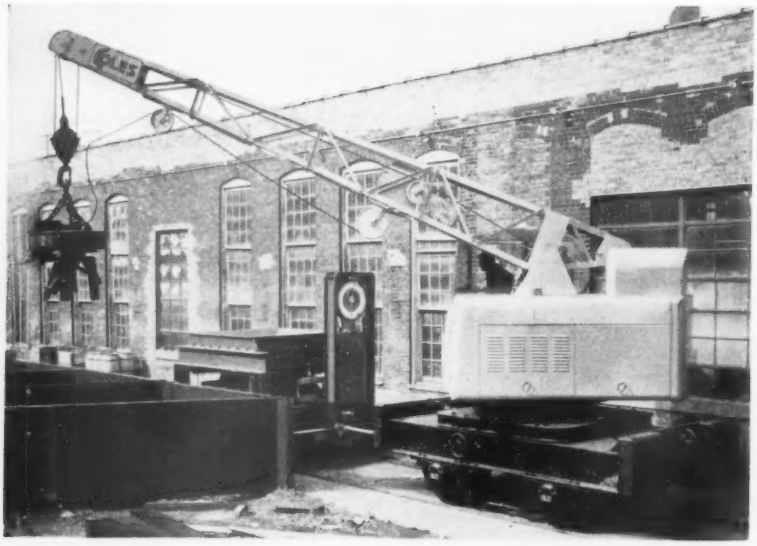
To visualize these problems, refer to Fig. 1, which shows the weight supported by several parallel banks of coil springs. If we were to pull the weight down from its neutral position, causing it to vibrate, the length of stroke would diminish continuously, but the number of cycles per second or frequency of its cycle would remain constant.

As the weight moves through its cycle, the spring alternately absorbs, then gives back practically the same amount of energy to the weight. The energy losses are those of internal spring friction and windage. The natural frequency drive operates in resonance with the motion of the trough or at an rpm which matches exactly the frequency of the spring-mounted trough and therefore acts only as an exciter making up these small energy losses.

The first requirement of the natural frequency drive is that it must be positive, in order to restrict the length of stroke. This positive control of amplitude is accomplished by the eccentric drive. The second requirement is that it must be capable of starting the conveyor under load. Fig. 3 shows a 95-ft-long foundry conveyor containing 114 coil springs. These coil springs actually are used as energy storage units and therefore are very stiff, requiring approximate-

Everything's stacked in your favor with this full-slewing cantilever boom

Rail or truck mounted—equipped with tongs, slings, clams or electromagnets—a Coles Mobile Crane is the foundry industry's most versatile handling tool.



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Circle 651 on Inquiry Card→

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CAPACITY 400 LBS. FOR JOBBING OR PRODUCTION

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- √ Push-button operation with dual buttons for safety . . . actuate entire cycle, clamp, blow, draw and magazine reload.
- √ Twin blow valves with high-speed, high agitation exhaust through magazine.
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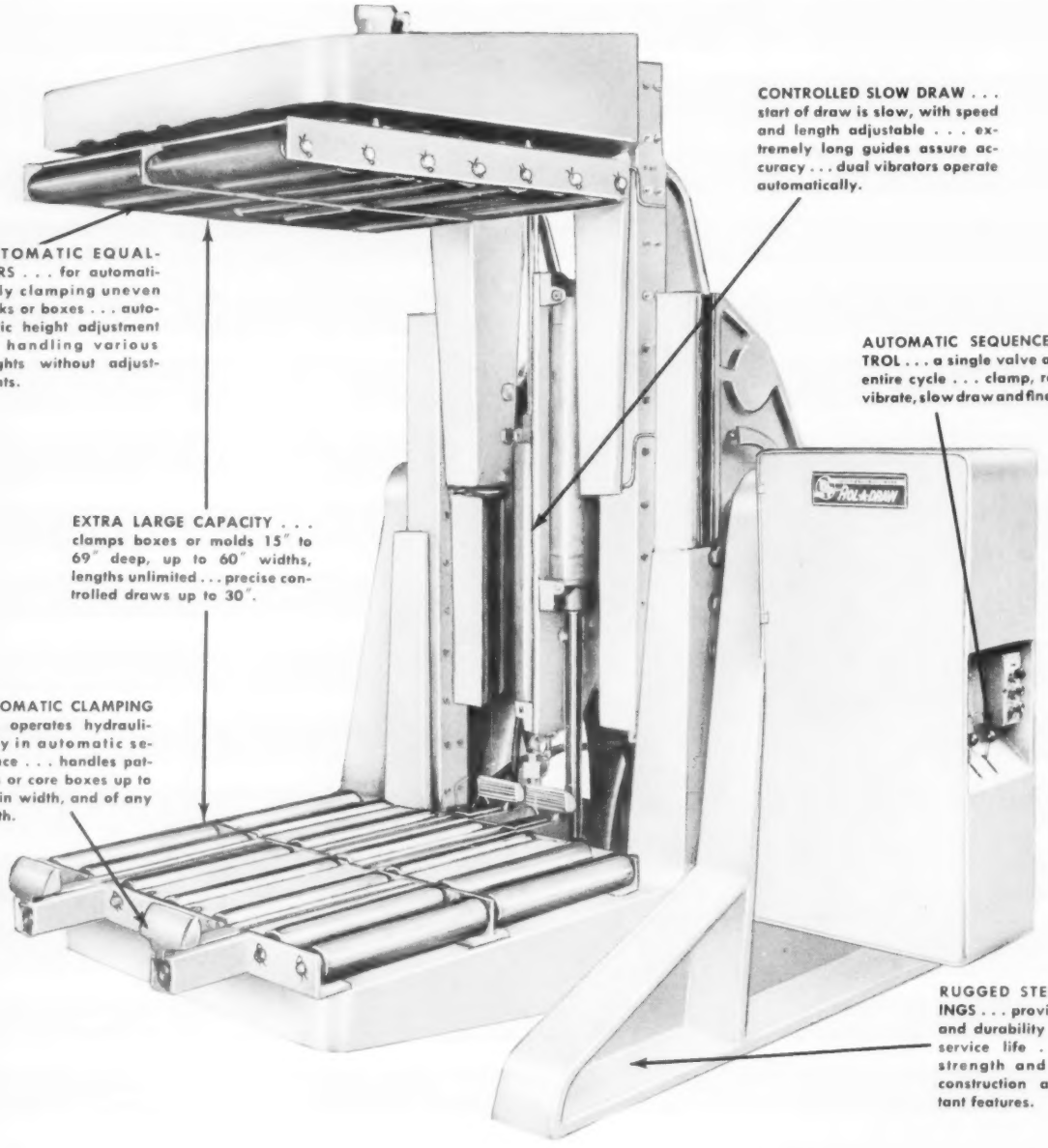
REDUCE CRANE HANDLING-COST-DELAY!

A New 5000 Lb. Rol-A-Draw • Floor Mounted • Rolls Over and Draws Patterns and Core Boxes to 30″


CONTROLLED SLOW DRAW . . . start of draw is slow, with speed and length adjustable . . . extremely long guides assure accuracy . . . dual vibrators operate automatically.
AUTOMATIC EQUALIZERS . . . for automatically clamping uneven flasks or boxes . . . automatic height adjustment for handling various heights without adjustments.
AUTOMATIC SEQUENCE CONTROL . . . a single valve actuates entire cycle . . . clamp, rollover, vibrate, slow draw and final draw.
EXTRA LARGE CAPACITY . . . clamps boxes or molds 15″ to 69″ deep, up to 60″ widths, lengths unlimited . . . precise controlled draws up to 30″.
AUTOMATIC CLAMPING . . . operates hydraulically in automatic sequence . . . handles patterns or core boxes up to 60″ in width, and of any length.
RUGGED STEEL CASTINGS . . . provide rigidity and durability over long service life . . . high strength and compact construction are important features.

THE ALL-HYDRAULIC 5030 ROL-A-DRAW... FAST, RUGGED and FLEXIBLE

Now this new 5000 lb. Rol-A-Draw brings all of the precision and cost advantages of machine rollover and draw to jobbing or production foundries handling large molds or cores. No pits are required for installation, and it features a 30-second automatic operating cycle with full 30″ draw. Not only fast, this new Rol-A-Draw is the most flexible yet designed. It automatically handles any flask or core box within its wide range without machine adjustments. It's ideal for multiple station molding or coremaking units, where its low "roll-in" height is invaluable. Automatic loading and ejection also available for production operation.

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ly 800 lb to compress them 1 in.

At an operating frequency or rpm of 470 cycles per minute, with a 1-in. stroke, 140 hp would be required for starting. Of course, this requirement is not practical, and the natural frequency drive linkage includes a flexible member which changes length during the first few revolutions of the eccentric, in effect, starting the conveyor with an infinitely small stroke or working up to stroke from Point A on Fig. 1. Thus, the flexible link is necessary so that a motor of reasonable size can be used for start-up. Once the conveyor is in motion, input power drops down to approximately 50 per cent of full load current.

The third requirement for a natural frequency drive is caused by the stopping cycle. When a conveyor such as that shown in Fig. 3 is stopped, the drive eccentric and trough motions must be allowed to come to rest separately, and this feat is accomplished by the flexible link.

The eccentric stops by slowing down or decreasing frequency at the same time, keeping stroke constant. Since it is supported on springs, the trough decreases stroke constantly, but maintains the same frequency. Thus the trough and the eccentric must be allowed to come to rest separately, or the tremendous force stored in the springs must be obsorbed in the drive. In the conveyor shown in Fig. 3, the drive would have to overpower a force of 4,750,000 in.-lb to bring the unit to rest.

Foundry Applications—There are many applications in the modern foundry for the vibrating conveyor.

Mold Dump Units—Collection of sand and castings from mold dump stations is a basic foundry use for this type of conveyor. The high surge loads of large dumps are typified by Fig. 4, which shows a typical dump of two molds weighing a total

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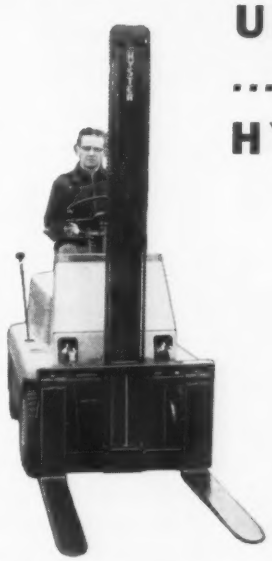

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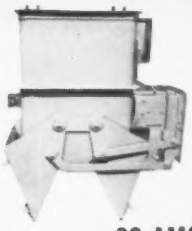
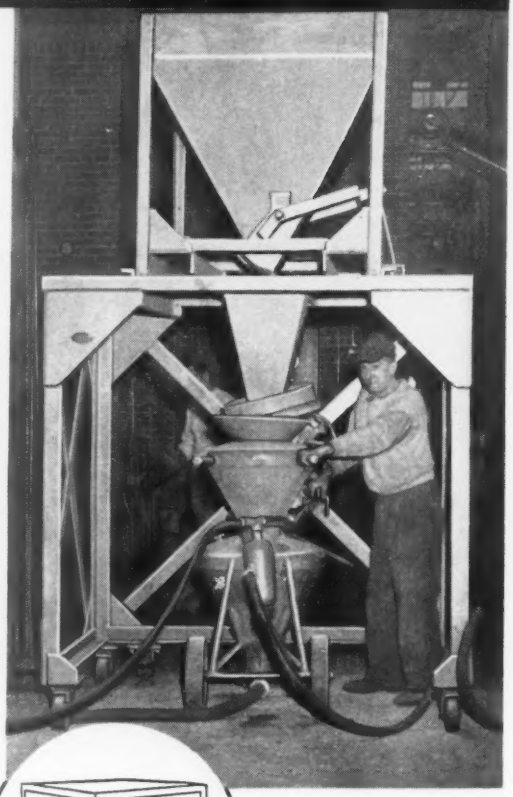
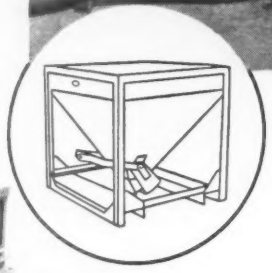


30-AMO

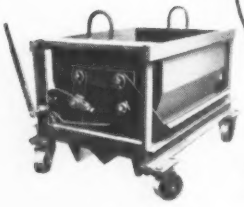
1-A

7-A

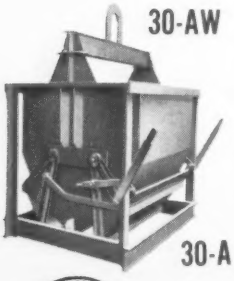




A special P-I designed hopper bucket makes cupola lining more efficient.



30-AW



30-A

WHERE bulk materials handling operations are costing you money and slowing production, Penn Iron Engineers can solve your problem economically, efficiently.

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READING, PENNSYLVANIA

of approximately 3500 lb with an average temperature of 700°F.

The conveyor shown is 80 ft long and has a replaceable trough fabricated of ½-in. steel plate 36 in. wide and 10 in. deep to contain the sand splash. Although not so shown, the entire unit is hooded and exhausted to remove fumes and heat.

Castings and Sand Separation — This operation is accomplished simply with a grizzly deck in a vibrating conveyor. This type of installation, shown in Fig. 5, is of assistance in reducing shakeout load.

Casting Cooler—Fig. 6 shows part of a casting conveying and cooling layout at a large malleable pipe fittings foundry. The castings are conveyed across a grizzly deck or perforated plate, and an induced air draft through the deck and conveyed mat of castings accomplishes cooling. A large stationary hood is used to collect dust and hot air, which are exhausted through a cyclone to atmosphere.

Conveying speed is approximately 5 fpm to get maximum retention time for high cooling rates. Carryover sand and cores are separated easily. They fall through the deck and conveyor to the end of the cooler, where separation takes place.

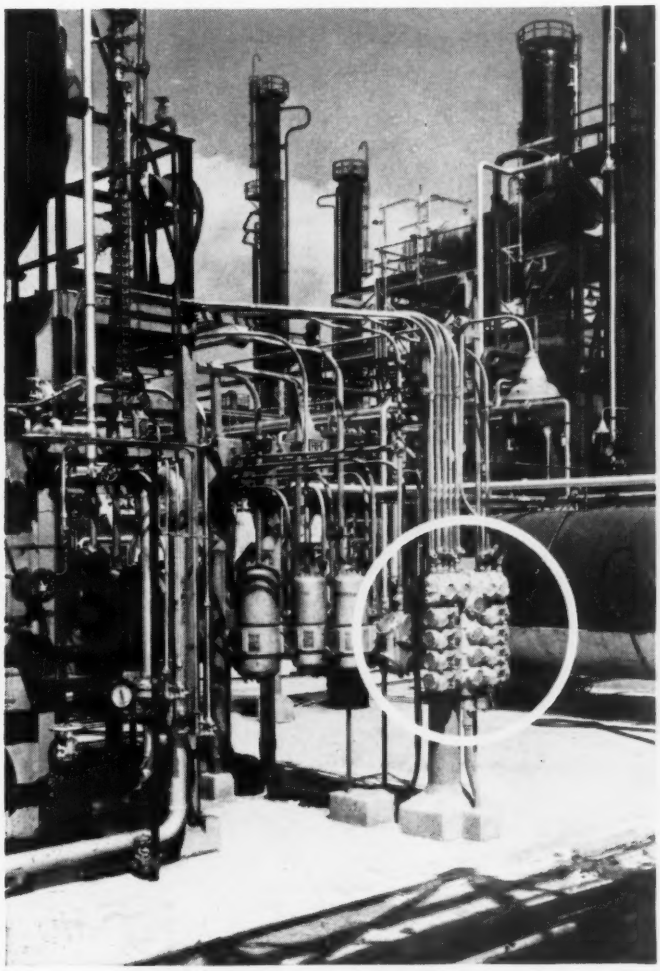
Back-Up Shot Separation—In shell molding operations, back-up shot and castings are separated easily by being conveyed across a grizzly deck. High-temperature construction permits trough expansion and contraction so that thermal stresses of hot shot are not imposed on the trough or supporting springs.

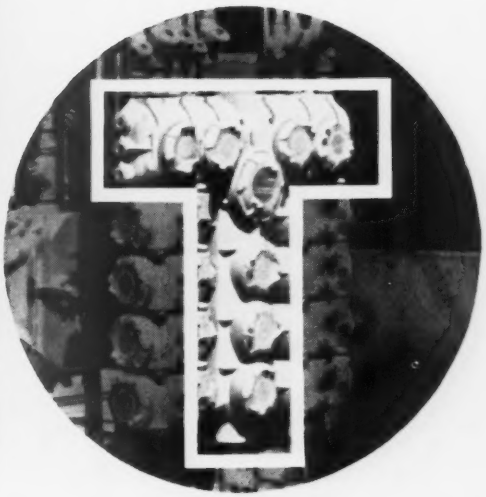
Casting Rollover Units — Large castings such as engine blocks and cylinder heads can be conveyed and turned over in transit, automatically emptying sand or cleaning shot from castings.

Casting Quench Conveyor—In the manufacture of certain types of metal, a quick air quench is required at a certain part of the process to fix the internal metal structure. This is being done successfully on a vibrating unit, the deck of which is actually a grizzly screen. Fig. 7 shows two 4-ft-wide x 50-ft-long units driven side by side with a single eccentric drive.

Redhot castings are dumped on the deck of the conveyor, and cold quench air is drawn through the hood and deck. This arrangement assures control of quench time, allows separation of carryover sand or shot and is a low maintenance machine in the most difficult of applications.

Cleaning Machine Discharge—Hot, clean castings as discharged from blast cleaning machines can be collected easily on a vibrating conveyor





Crouse-Hinds type EDP explosion-proof panelboard installed and operating in an oil refinery. This 12-circuit condulet is built around a single T-shaped casting (outlined above) of dependable Hanna pig iron.

Crouse-Hinds depends on HANNA PIG IRON to keep explosions under control

The explosion-proof panelboard shown above is manufactured by Crouse-Hinds Co., of Syracuse, N.Y., a leading manufacturer of electrical equipment, specifically for use in hazardous locations where certain flammable gases and vapors are present. The cast enclosure *must* be flame-tight, non-porous and of high quality. That is why Hanna iron was chosen for this very important component.

Hanna makes all regular grades of pig iron, plus HannaTite and Hanna Silvery, and all are available in two sizes—the 38-pound pig and the smaller HannaTen ingot. Every Hanna iron has the qualities that produce denser, stronger castings with uniform machining qualities. To obtain prompt, expert servicing of your iron requirements, just call on Hanna or any of our trained representatives.

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Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

Why a Foundryman reports that his DAVENPORT HANSBERG *Shooter*® shows Reduction of approximately 50% in core costs over his conventional BLOWER costs.

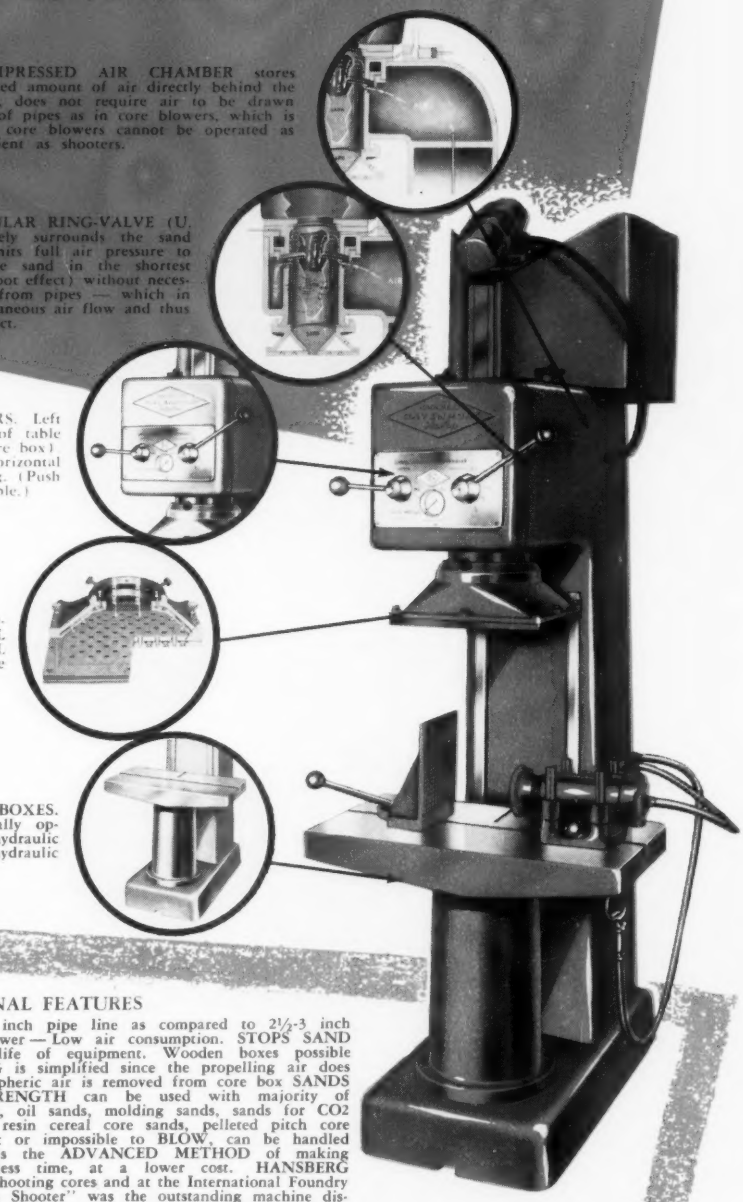
1 COMPRESSED AIR CHAMBER stores limited amount of air directly behind the sand, does not require air to be drawn out of pipes as in core blowers, which is why core blowers cannot be operated as efficient as shooters.

2 LARGEST ANNULAR RING-VALVE (U. S. Patent) entirely surrounds the sand chamber — Permits full air pressure to explode upon the sand in the shortest possible time. (shoot effect) without necessity to draw air from pipes — which in turn slows instantaneous air flow and thus kills the shoot effect.

3 ONLY TWO CONTROL LEVERS. Left handle for hydraulic adjustment of table height (also hydraulic draw of core box) Right handle, semi-automatic for horizontal and vertical clamping and shooting. (Push button cycle timing is also available.)

4 SHOOTER HEADS are quick interchangeable with 3 types available — UNIVERSAL HEAD, STANDARD HEAD or SPECIAL HEAD — Built to meet special core specification.

5 RAPID CHANGE OF CORE BOXES. Adjustable table height hydraulically operated, telescoping cylinders, hydraulic AND air operated with 12 inch hydraulic and 7 inch air draw.



ADDITIONAL FEATURES

AIR CONNECTION requires only 1 inch pipe line as compared to 2½-3 inch diameter pipe lines for same size blower — Low air consumption. STOPS SAND BLASTING of core boxes — longer life of equipment. Wooden boxes possible without special attachments. VENTING is simplified since the propelling air does not mix with the sand and only atmospheric air is removed from core box SANDS WITH EXCEPTIONAL GREEN STRENGTH can be used with majority of core boxes. High green strength sands, oil sands, molding sands, sands for CO_2 PROCESS, shell molding resin sands, resin cereal core sands, pelleted pitch core sands etc., — which are either difficult or impossible to BLOW, can be handled by "SHOOTING". "SHOOTING" is the ADVANCED METHOD of making foundry CORES more uniform, in less time, at a lower cost. HANSBERG "SHOOTERS" is a patented method of shooting cores and at the International Foundry Exhibition held in Germany this "Core Shooter" was the outstanding machine displayed — (over 4,000 are in operation).
FIVE SIZES — "DAVENPORT SHOOTERS"
built in 5 sizes, capacities 4 - 17 - 42 - 88 - 275 pounds.

The term "Shooter" is a registered trademark of Davenport Machine and Foundry Company.

DAVENPORT MACHINE AND *Foundry Company*
Davenport, Iowa, U.S.A.

as shown in Fig. 8. Resistance to impact, abrasive wear and temperature are points to be considered. In addition, the conveyor action smooths out surge loads of castings, making the picking operation easier.

A small grizzly or perforated plate sometimes is used to separate carryover shot.

Picking Tables—Vibrating conveyors frequently are used as picking tables because they not only move castings slowly and resist abrasive wear, but also are able to smooth surge load lumps of castings to enable more accurate picking. The vibrating action is extremely gentle so that the most thin-walled casting can be handled without damage.

Investment Casting Course To Be Presented at MIT

Its second annual course on investment castings has been announced by the Investment Casting Institute, Chicago. It will be presented Sept. 8-13 at Massachusetts Institute of Technology, Cambridge, Mass., under the direction of Professors Nicholas J. Grant and Howard F. Taylor, MIT.

Subjects to be covered in lectures, laboratory exercises and demonstrations include investment materials, melting, gating, risering, solidification and heat transfer, metal and alloy systems, casting defects and consideration of new processes in the field. Maximum enrollment is 60 persons, and nonmembers of ICI may attend. Further information is available from the Office of the Summer Session, Room 7-103, MIT.

Slide Film Covers Mechanical And Hydraulic Lift Trucks

A slide film dealing with mechanical and hydraulic lift trucks now is available from the Association of Lift Truck & Portable Elevator Manufacturers, Suite 759, One Gateway Center, Pittsburgh 22, Pa.

The 30-frame film is complete with script and covers basic types of hand lift trucks and their principles of operation and applications. It can be shown in about 30 minutes. Part of the association's program of providing basic information on hand lift trucks and portable elevators, the film can be ordered for $2.

Another item available in the program is a basic booklet, "Mechanical and Hydraulic Hand Lift Trucks." Single copies are available free of charge, and additional copies may be had for 20 cents each.

Ohio Steel Foundry and Its Founder Mark Anniversary

Sept. 21 will mark the 50th anniversary of the pouring of the first heat by the Ohio Steel Foundry Co. at Lima, Ohio. The company has the unusual distinction of having been guided throughout its first half-century by one of its founders—John E. Galvin, chairman of the board.

In 1907, Mr. Galvin and Harry Wright, then managers of two American Steel Foundries plants, joined with John W. Kaufman, a Columbus, Ohio, capitalist, in incorporating the Ohio Steel Foundry Co. A small foundry was built at Lima under the supervision of Mr. Galvin. During World War I a second steel foundry was acquired at Springfield, Ohio.

JOHN E. GALVIN

World War II resulted in additional expansion when the company proved that cast steel could be substituted successfully for a forging in the production of breech rings for artillery. A new breech ring foundry was built at Lima for the Ordnance Corps, and by the end of the war, Ohio was producing more than 90 per cent of all the breech rings used. This plant subsequently was acquired by Ohio Steel and equipped for the production of mill rolls.

Today the Lima facilities are devoted exclusively to the making and machining of cast steel, cast iron, and forged and hardened rolls for rolling mills. At Springfield an electric steel foundry produces small and medium-sized carbon and low alloy castings and a high-alloy foundry makes castings for heat and corrosion resistant applications. Also located at Springfield is the Oil Refinery Fittings Division, which manufactures high-alloy fittings for oil refineries and petro-chemical plants.

Mr. Galvin, son of a steelmaker, attended Wittenberg College and started his industrial career in 1900 with the Illinois Steel Co., South Chicago, Ill. From 1902 to 1904 he was assistant superintendent, Peru Steel Casting Co., Peru, Ind. The next three years were spent with American Steel Foundries at Pittsburgh and Franklin, Pa. Mr. Galvin was vice president of Ohio Steel from its founding until 1918, when he became president. In 1951 he was made chairman and his son, Robert F. Galvin, succeeded him as president.

Mr. Galvin is a past president of the Steel Founders' Society of America and a past director of the American Foundrymen's Society, which awarded him its John A. Penton Gold Medal in 1942.

Vacuum Techniques Symposium Will Be Held in Boston

A program of broad interest to research, engineering and production people whose operations employ vacuum techniques will be presented at the fourth National Symposium on Vacuum Technology, to be held Oct. 9-11 at the Hotel Somerset, Boston. Approximately 25 papers will be offered, covering fundamental advances in vacuum technique, means of producing, measuring and conducting low pressures and advances in applications of vacuum to processing.

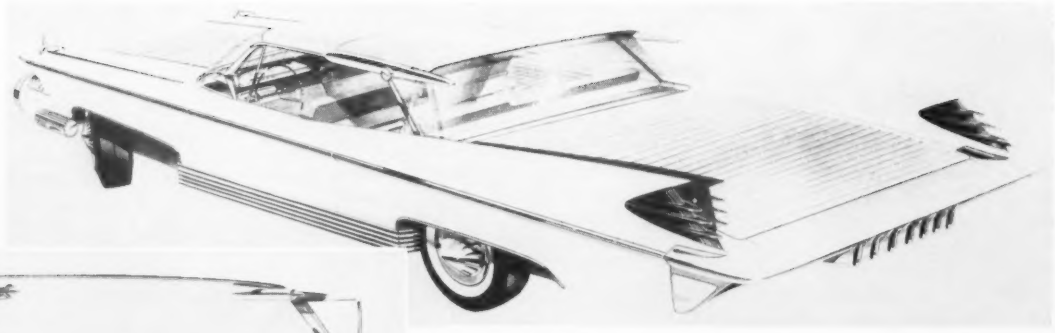
Further information is available from the Committee on Vacuum Techniques, Box 1282, Boston 9, Mass.

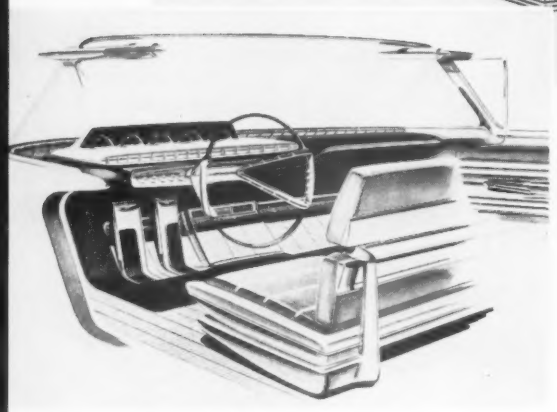
Book Review

Practical Automation: Methods for Increasing Plant Productivity, by Lester R. Bittel, Morley G. Melden and Robert S. Rice, 384 pages, 8½ x 11 in., published by McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. Price, $7.50.

The authors have designed this practical guide to show how engineers and managers can use automation in manufacturing to increase productivity, cut operating costs and improve safety and working conditions.

It explains and illustrates fundamental essentials to planning and setting up effective automation. Scores of examples of successful installations of varied sizes and types are described. In addition, it demonstrates ways in which small plants can be automated and discusses how to solve problems likely to be encountered during installation of automation.

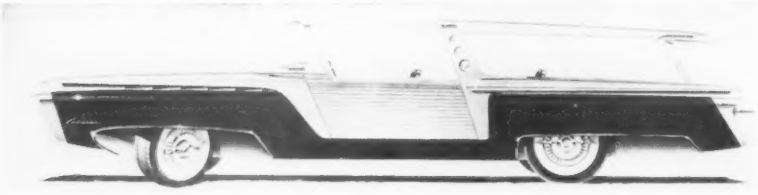




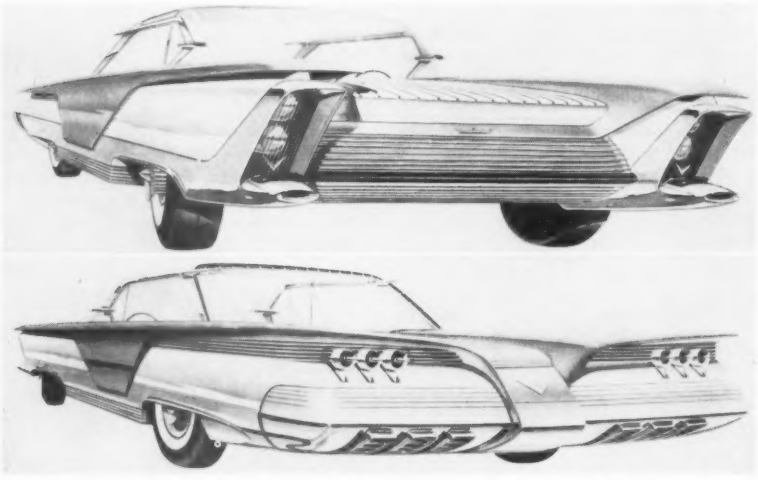
The imaginative Piedmont has aluminum in die-cast doors, a cast frame with exposed edge to form a car-length molding strip, cast muffler and cast wheel, hub, brake drum assemblies

Inside, the Piedmont has cast aluminum firewall, toe-board and panel parts, heat and vent grilles, door panels and trim

Imagination and CAST ALUMINUM *In Automobiles*



The Golden Gate station wagon has, among other aluminum parts, die-cast wheels with integral hubs and brake drums and cast bumper sections



In the Del Mar, front bumper ends and lightweight hood shown in top view are cast. The rear view at bottom portrays cast aluminum deck and fender sections and cast parts at bumper ends for decoration

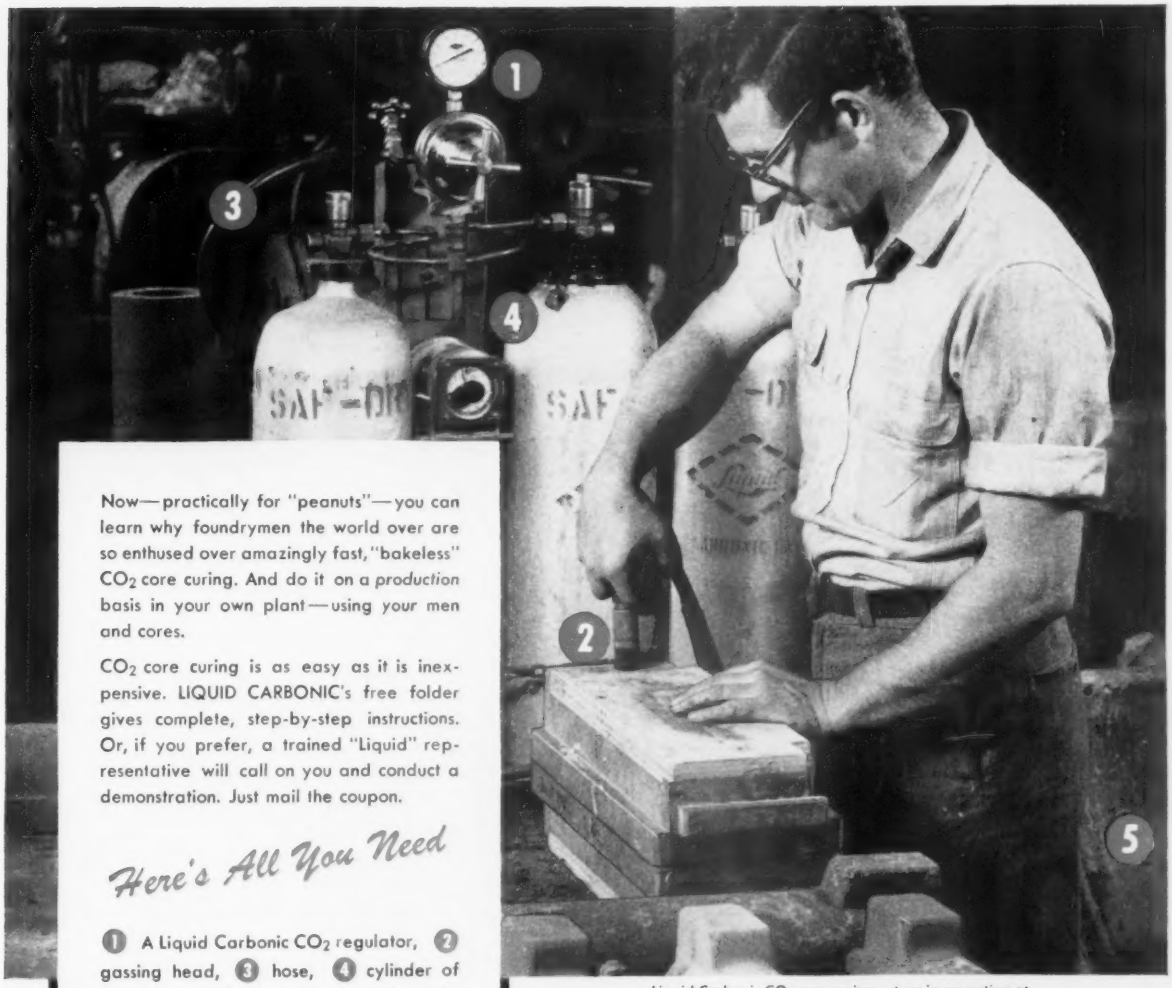
AN imaginative presentation on the use of aluminum in futuristically styled automobiles recently was given to leading automobile stylists by the Industrial Design Department of Kaiser Aluminum & Chemical Sales Inc. The presentation was made to suggest new uses of aluminum and was not an attempt to influence specific design trends.

Many of the concepts and approaches while new in the automotive industry, are based on principles employed successfully in other fields. They make use of aluminum's claimed properties of attractive appearance, corrosion resistance, easy formability and good strength-to-weight characteristics.

Three-piece retractable hard tops, roll-down doors and roll-away hoods and deck covers, die cast integral wheel and brake drum assemblies, body panels with sweeping lines, textured aluminum floorboards and seat risers, aluminum instrument cluster panels and unusual surface effects, indicating the variety of textures and anodized colors possible with aluminum, were among the stimulating ideas offered.

The presentation featured renderings of six basic passenger car designs and was highlighted by the projected styling of an all-aluminum car named the Piedmont. Important components of the Piedmont include

a production CO_2 core curing set-up for less than $50.00



Liquid Carbonic CO_2 core curing set-up in operation at Pacific Brass Foundry, San Francisco, California.

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CO_2 core curing is as easy as it is inexpensive. LIQUID CARBONIC's free folder gives complete, step-by-step instructions. Or, if you prefer, a trained "Liquid" representative will call on you and conduct a demonstration. Just mail the coupon.

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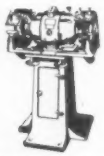
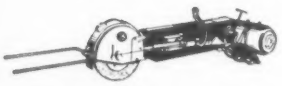
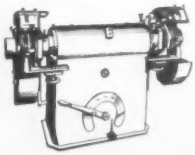


DIRECT DRIVE



SWING FRAME



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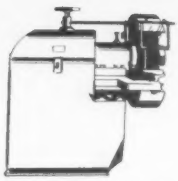

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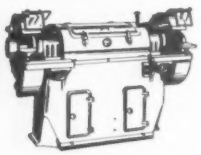

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The United States Electrical Tool Co.
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many cast parts.

Cast wheel, hub and brake drum assemblies are said to provide good brake performance by reducing fade, a comfortable ride through reduction of unsprung weight and good acceleration through weight reduction.

The frame and firewall assembly consists of die-cast aluminum sections bolted together to form an integral structure. Exposed frame rails make attractive molding strips. The die-casting process offers economies by eliminating the need for drilled holes and small gussets and other attached reinforcing members. It also permits combining heater ducts or plenum chambers into an integral part of the casting.

Front floor boards and seat risers are integral parts of the cast aluminum platform frame. Cast floor boards may have a textured surface, eliminating the need for all-over carpeting. Rounded corners simplify cleaning. Castings are incorporated into bumpers and roof frame and supports. Doors are die-cast, and exhaust mufflers are finned aluminum castings.

Aluminum engine block, automatic transmission housing and other engine parts such as the distributor housing, carburetor body, intake manifolds, valve covers, fuel pump housing, water pump body, water manifolds and power steering housing also are cast.

New Grinding Wheel Simplified Practice Recommendation Ready

The U. S. Department of Commerce has approved for distribution the new, revised *Grinding Wheel Simplified Practice Recommendation*, published by the Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, O.

The new 76-page edition supersedes one issued in 1947 and contains all data contained in the official 1957 government edition. The first of its two parts, "Use Classification," lists standard shapes and sizes of grinding wheels classified according to end use. The second part, "Standard Shape Types and Sizes," contains a complete listing of all standard sizes of grinding wheels available in each standard shape type.

Changes in content of the book include addition of six new basic grinding wheel shapes—Types 23, 24, 25, 26 and 27. A word description has been added for each of the standard wheel shapes to clarify the line drawings.

Single copies of the publication are available free of charge by request on company letterhead.

Circle 657 on Inquiry Card—Page 51

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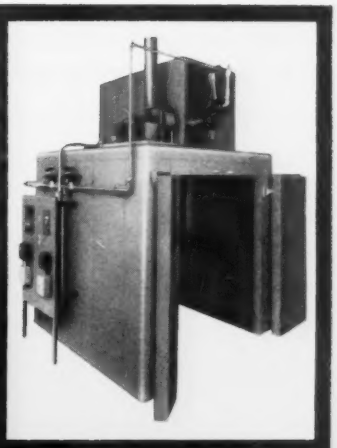
Dictate Oven Requirements

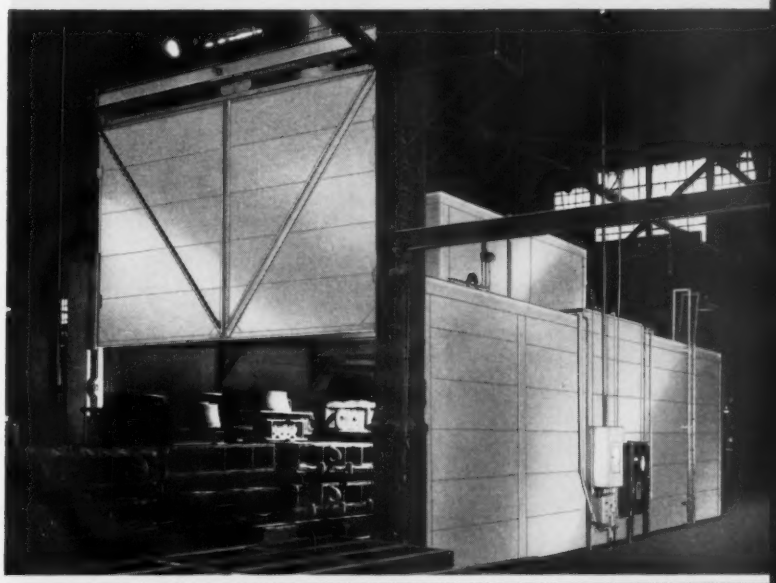
LANLY can meet any and all of yours

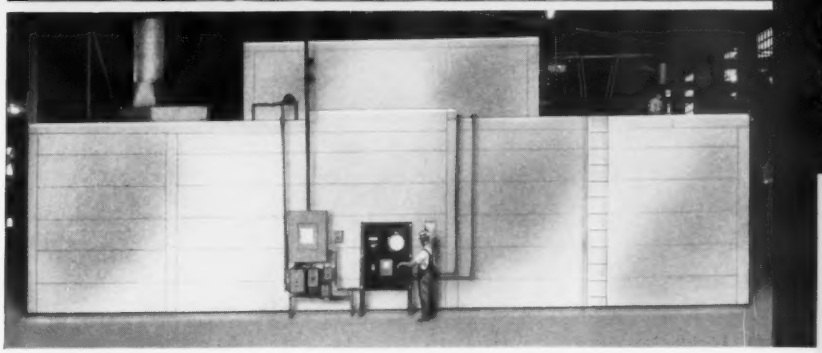
- from Small RACK TYPE OVENS

generally used when the baking of smaller cores is required in the production operation of your foundry.



-to Gigantic CAR TYPE OVENS





when the drying of large molds and cores for bigger castings is required.

This huge installation in the foundry of a large supplier of railroad products efficiently and economically carries its share of the load in the production of better castings.

Consult LANLY for a proposal on foundry ovens before you buy. A check of your present equipment may disclose a fuel eater, a core spoiler or a heat loser amongst them.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

THE Lanly CO.

FOUNDRY OVENS

780 Prospect Ave. • Cleveland, Ohio

Circle 658 on Inquiry Card—Page 51

Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Philadelphia . . . Boston

Chicago— As reported here in July, the city of Chicago has a new zoning code as a result of comprehensive amendments unanimously passed by city council late in May. Included in the revisions were sections on noise and vibration, but the sections on smoke and particulate matter, or dust, were taken out completely for incorporation in a new air pollution amendment for later adoption.

The city's Air Pollution Control Department has drafted provisions for the smoke and particulate matter sections. These were then referred to the special task committee from industry which Mayor Richard Daley had previously appointed to facilitate preparation and approval of the zoning code amendments. This committee has foundry representation through several of its members, including the chairman, Edward C. Logelin, vice president, United States Steel Corp.

During recent weeks, the code groups have held some 30 meetings, and good progress is reported. A study has been made as to how the new proposed regulations would affect foundries, and foundry management reaction has been sought in several instances.

Prospects are that a draft of the new provisions will be ready for city council consideration in late September. It is said that foundries as well as other industries will be able to live with the provisions without undue hardship.

Philadelphia—Foundrymen look for a more substantial pickup in business after Labor Day. A mild gain was noted in August, but the situation was generally spotty.

Currently, gray iron shops average a little better than four days a week, with demand diversified and backlogs around two weeks. Steel foundries, running close to five days a week on medium and large size work, offer deliveries of four to five weeks. Malleable shops report a continued lag in hardware specifications, but manage to keep going at five days a week with limited working forces. Backlogs average three to four weeks.

Brass and bronze shops generally are operating poorly, particularly those engaged in the manufacture of meters and plumbing supplies. In industrial pumps and valves the picture is a little brighter. Demand for ship castings is keeping captive shops well engaged, but is not doing much for the job shops. Aluminum foundries are doing better on a somewhat more diversified volume of inquiry. Most of these shops are operating five days a week, with backlogs creeping up.

Raw material supply is adequate in all lines. Around mid-August the Alan Wood Steel Co. got into normal production on one of its two blast furnaces at Swedeland, Pa., which had been down for several weeks for repairs and enlargement. This stack now has an increased capacity of 89,400 tons annually and equals in size the company's other furnace. Pig iron prices in this area were advanced $1.50 a ton in July.

Boston—Iron and steel foundries are working back to five-day week schedules after seasonal summer slack; all shops have not increased melt to that point but more are gradually moving toward that level. One mechanized gray iron foundry is operating conveyor lines on five-day week schedule for first time in six months.

Steel foundries and producers of heavier castings are busiest and have the best backlogs, notably those supplying components for heavy electrical equipment and marine use. Shipyards also have substantial nonferrous volume out, including wheels.

Machine tool volume is off. Malleable shops are getting back to normal schedules slowly; in several instances the upward trend is retarded by substantial inventories of finished castings. Gray iron foundry backlogs are low, notably with jobbing shops, but spot orders for prompt delivery are booked more frequently.

Textile equipment builders are operating well below capacity on normal work, but several have mechanized and are booking tonnage outside their normal field. This is contrary to former trend when textile

CALIFORNIA GRAY IRON MEETING: More than 125 foundrymen and their families enjoyed the fourth annual California regional meeting of the Gray Iron Founders' Society. A highlight of the meeting was an extra day devoted to the GIFS Marketing Seminar, which was conducted by Richard C. Meloy, marketing director, and E. Harold Mitchell, field director. President J. Scott Parrish and Executive Vice President Donald H. Workman also attended. Topics covered at the business meeting included the scrap export situation, apprentice programs, current air pollution regulations and other pertinent subjects

How a Foundry Stopped Scabs and Buckles ...with MAPLEX®

PROBLEM:

Have you ever jumped out of the frying pan of scabs and buckles into the fire of cuts and washes? This happened recently in a midwest foundry when it counted on the expansion value of wood flour but ignored its effect on hot strength.

SOLUTION:

The IMC sand man quickly spotted the heart of the problem . . . their choice of wood flour. Consideration of the total effect of the flour indicated the need for hard maple. *Maplex* provided the protection against scabs, buckles and rattails, while the increased hot strength at 2000°F avoided any danger of cuts and washes. These benefits were in addition to the usual wood flour effects on flowability, shake-out, peel and cleaning.

You'll find that the man from IMC, an experienced expert in sand problems, can be of great help. It's his job to recommend the correct materials and the proper procedures to help you make better castings at lower cost.

For helpful information on wood flour, write for our booklet "How to get the most out of wood flour with Maplex"

EASTERN CLAY PRODUCTS DEPT.
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
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equipment foundries were among leaders in farming out castings.

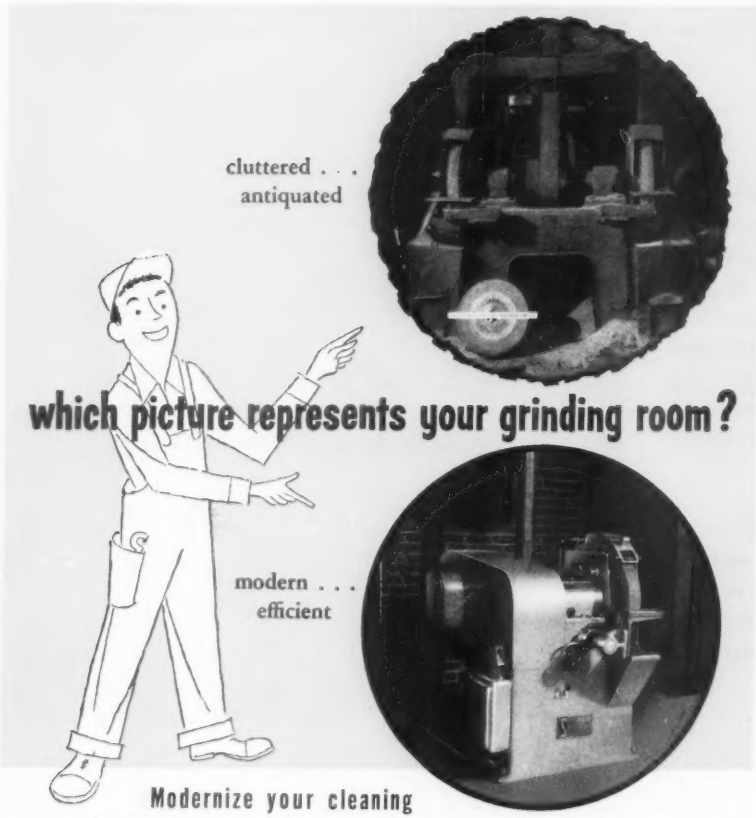
Hunt-Spiller Mfg. Corp., Boston, has another electric furnace in operation, expanding its steel casting capacity. This shop, always a factor in railroad supply, continues to retain a position in that field, producing diesel liners among other castings. Valve and bearing plant suppliers are holding at relatively good rate.

Pig iron prices will probably advance again in October. Costs with the Everett furnace are higher, and prices for approximately 225 New England shops are based quarterly on production costs. Under contracts with foundries, Mystic is unable to anticipate the extent of price changes; they become applicable after costs are established. Mystic raised iron 50 cents a ton in third quarter, but for the last three months of 1957 the increase is likely to be more.

Pittsburgh— Effects of the summer slowdown in foundry activity, which were first noticed in July, continued into August. Producers of foundry equipment report that a slowdown in rate of incoming orders began in July and is still continuing. Fortunately, a few large orders have provided a fairly good backlog, and operations have been satisfactory. Although the number of inquiries is high, there's no indication yet of an improvement in orders.

Gray iron and steel foundries report sales are dull but no worse than in previous peacetime summers. Suppliers to automakers expect an upturn in business in late September or October. Suppliers to earthmoving equipment builders say their sales dipped in June and are now slightly below last year's levels. With a large amount of construction and roadbuilding work planned for next year, shipments of castings to such firms as power shovel manufacturers should rise in fourth quarter and remain high through the early part of 1958.

Foundries supplying steel mills with equipment say the rate of incoming orders fell in early third quarter. There is no sign of a change in the rate of orders, but these firms have a heavy backlog of unfilled orders.



Modernize your cleaning room with Standard's cost cutting, high production snagging grinders

This single wheel infinitely variable speed grinder maintains 9500 S.F.P.M. all the way down to the flanges. By turning hand wheel, guard is adjusted and spindle speed is increased simultaneously in relation to worn wheel. No tools are needed for adjustment.

Available in single and twin wheel construction. 5 HP to 100 HP. 18" to 30" wheels.

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MACHINE TOOLS
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Chicago Amphitheatre
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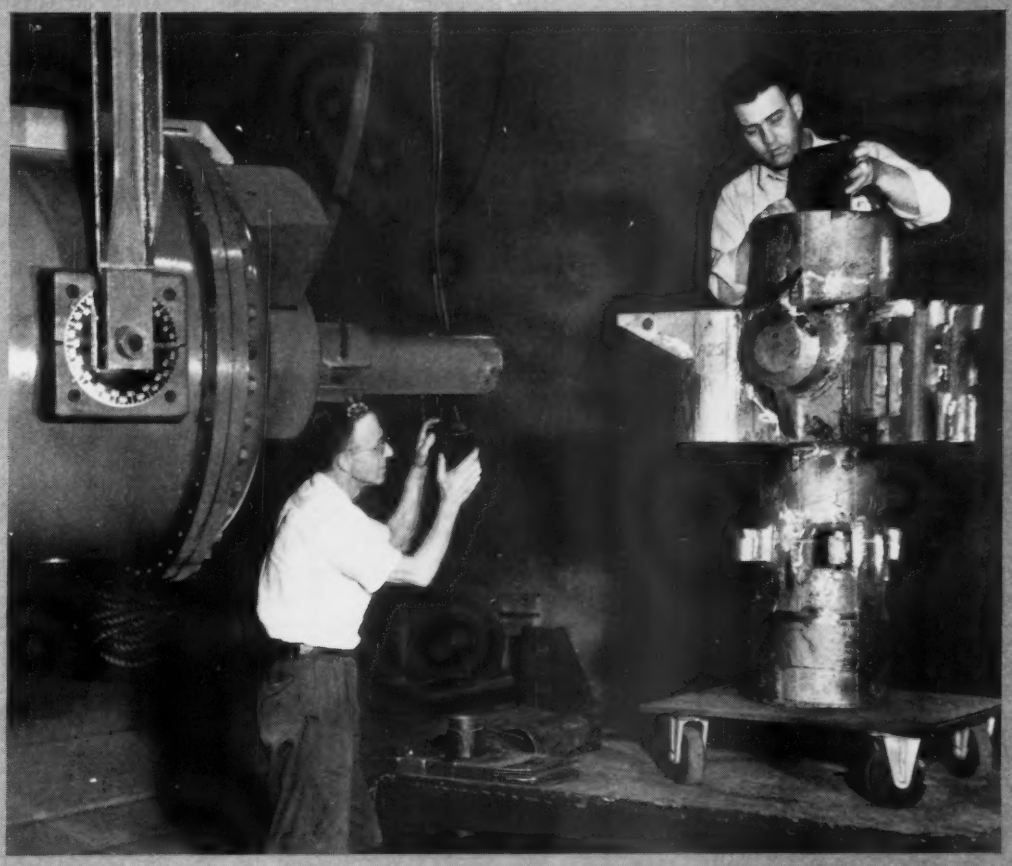
Aircraft Castings Association Is New Foundry Trade Group

Representatives of five foundries met in Los Angeles July 9-10 to establish a new foundry trade organization and to participate in technical discussions.

The name chosen for the new group is the Aircraft Castings Association. Its purpose is "To promote through co-operative action and mutual agreement and understanding the expanded use of ferrous castings in the aircraft and missile industries." To facilitate this ob-

"I thought it out of character when Pennypincher promised his bride an aerial honeymoon."



Watchdog on mounting costs

PRICES of common materials keep going up. Many new alloys are costly. Hence, rough castings become more expensive.

Even more, the cost of machining time keeps mounting. No one can afford to have it wasted by waiting for the tool to locate a void or defect.

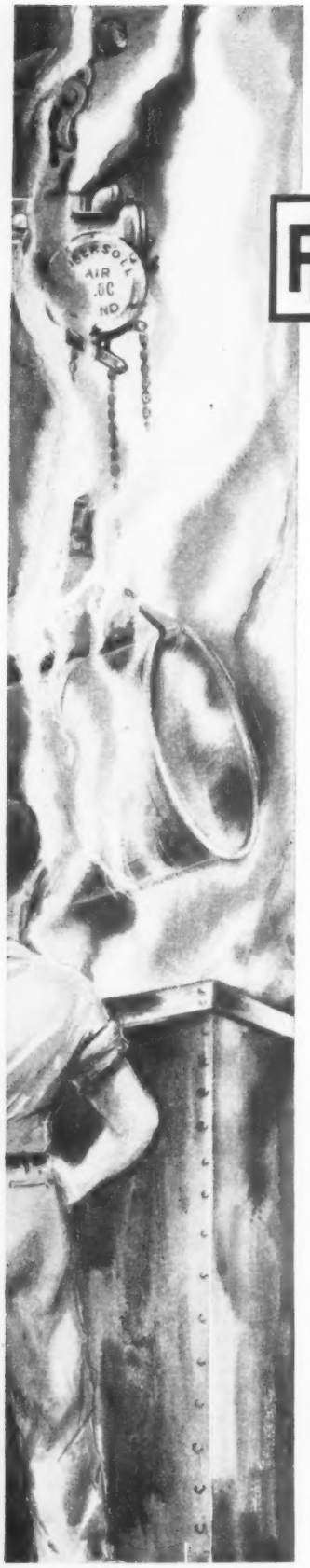
So now is a good time to re-examine the importance of radiography. To suppliers it gives the assurance that only a quality product is delivered. To processors it gives the confidence that man and machine time will be productive—not wasted.

Today, million-volt x-ray equipment radiographs heavier parts with shorter exposures. The use of radioactive isotopes makes possible a radiographic department at moderate cost. And the new Kodak Industrial X-ray Film Type AA—with up to twice the speed of the previous film—widens the scope of all radiographic equipment.

If you would like to know how radiography can save you money—how it can keep the quality of castings high—have a serious talk with your Kodak x-ray dealer or Kodak technical representative.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Kodak
TRADE MARK



in steam and vapor
300 LIFTS per hour
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overhead air hoists set new performance records

Since 1945 two Ingersoll-Rand Overhead Air Hoists have been continuously used by a firm in cleaning 55 gal. drums. These drums are slung beneath the hoists and lowered into a cleaning bath consisting of hot water and strong wetting and cleaning agents. As a result, clouds of steam and vapor practically obscure the hoists at all times. And except for minor repairs and standard maintenance, these hoists have never stopped.

Dependability and rugged construction are just two of the reasons why more and more plant men are specifying Ingersoll-Rand Air Hoists. These other important advantages contribute to long life and easier, safer operation:

Automatic Brake—holds the load automatically

Automatic Safety Up-Stop—shuts off air, stops motor before load reaches hoist

Graduated Reversing Valve—instant and complete control of hoisting action

Poppet Throttle Valve—prevents air leakage when hoist is idle

Pendent Throttle—The only complete line of air hoists with convenient "one hand" control.

Ingersoll-Rand Overhead Air Hoists are available in many types and sizes. Capacities range from 200 lbs. to 24,000 lbs. Your I-R AIRengineer can point out how these air hoists can give you new hoisting economy. Call him today, or write direct for catalog data.

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11 Broadway, New York 4, N. Y.

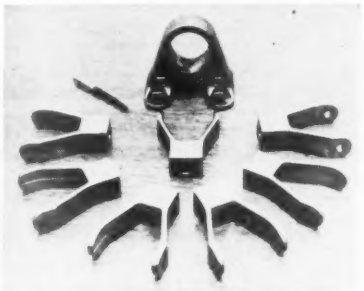
jective, members have agreed to meet periodically to exchange technical information and to assist each other in the solving of scientific and technical problems.

On the agenda for the first meeting were two business sessions and two technical discussions. Dr. William Rice, Electric Steel Foundry Co., addressed the group on welding specifications, welding procedures, weld inspection procedures and the general approach to the sale of weld repairs to aircraft companies. Edward B. Tilley, Pacific Alloy Engineering Corp., led a discussion on acceptable quality standards from the standpoint of aircraft companies and commented on aircraft inspection procedures.

Charter members of the Aircraft Casting Association are Electric Steel Foundry Co., Portland, Oreg.; Hanford Foundry Co., San Bernardino, Calif.; Pacific Alloy Engineering Corp., El Cajon, Calif.; Stanley Foundries Inc., Huntington Park, Calif.; Lebanon Steel Foundry, Lebanon, Pa.; and High Integrity Cast Alloys Inc., Shreveport, La.

Oregon Company Is Casting Titanium and Zirconium

A 100-lb capacity consumable electrode furnace for the production of titanium and zirconium castings



is in operation at Oregon Metallurgical Corp., Albany, Oreg. Since titanium and zirconium in the liquid state react with every known element except argon and helium, the mold itself must be contained in the melting furnace.

Water-cooled copper and graphite molds have been used successfully, and castings of 125,000-psi tensile strength have been produced, with higher tensile alloys under development. At the end of the melting process, the entire furnace, mold and all, is rolled over to pour the liquid metal into the mold.

Castings soon will be available as pure titanium or zirconium or al-

loyed with aluminum, vanadium, tin, chromium, manganese and molybdenum or in almost every alloy combination. Shown here is a group of titanium castings.

Releases Manual on Machining And Grinding Iron Castings

A 57-page manual on *The Machining and Grinding of Gray and Nodular (Ductile) Irons* has been released by the Gray Iron Founders' Society, 930 National City-East Sixth Building, Cleveland. Written by Norman Zlatin, Metcut Research Associates, and Charles F. Walton, technical director, GIFS, the manual is intended for use in the design, engineering and production of cast components.

Part I, "Machining," includes chapters on selection of tool materials, grinding cutting tools, machining applications, machining properties of iron castings, economics of machining and general recommendations. Part II, "Abrasive Finishing," covers types of finish grinding, honing and lapping.

The volume is abundantly illustrated and includes commercial and practical examples. It presents recommended practice for feeds and speeds as well as tooling and gives machinability data, related to microstructure, for the various types of iron. Cost of the manual is $3.

International Foundry Congress Transactions Are Available

Transactions of the International Foundry Congress held in Stockholm, Sweden, Aug. 19-24, including papers presented at the meetings, are available. Those desiring copies should write to Sveriges Mekanforbund, Foundry Section, Karlavagen 43, Stockholm, Sweden.

Book Review

La Chimie de la Dolomie, by Andre and Marcel Guedras, paperbound, 6 x 9½ in., 96 pages, published by Eyrolles, 61, Boulevard Saint-Germain, Paris 5, France. Price, 1000 fr.

A documentation of all possible uses of dolomite, this volume is addressed to all users of the material, direct or indirect. Special emphasis is given to its applications in the extraction of magnesium and in decarbonation, as well as its use as a refractory. Precise data are offered on the occurrence of French dolomite, its particular uses and the possibilities of its exploitation.

"SAND WIPER" rammer

SEALS OUT sand and dirt for longer life and maximum power

NEW

Exclusive new front-end design assures more efficiency, less wear and longer life. Sand, dirt, or abrasive material cannot enter the bore of the guide or the barrel to cause friction and wear. Compact, lighter-weight design improves handling. Balanced blows make the tool float over the work faster and easier. Write for form 5216 describing both bench and floor units or ask for a demonstration in your plant.

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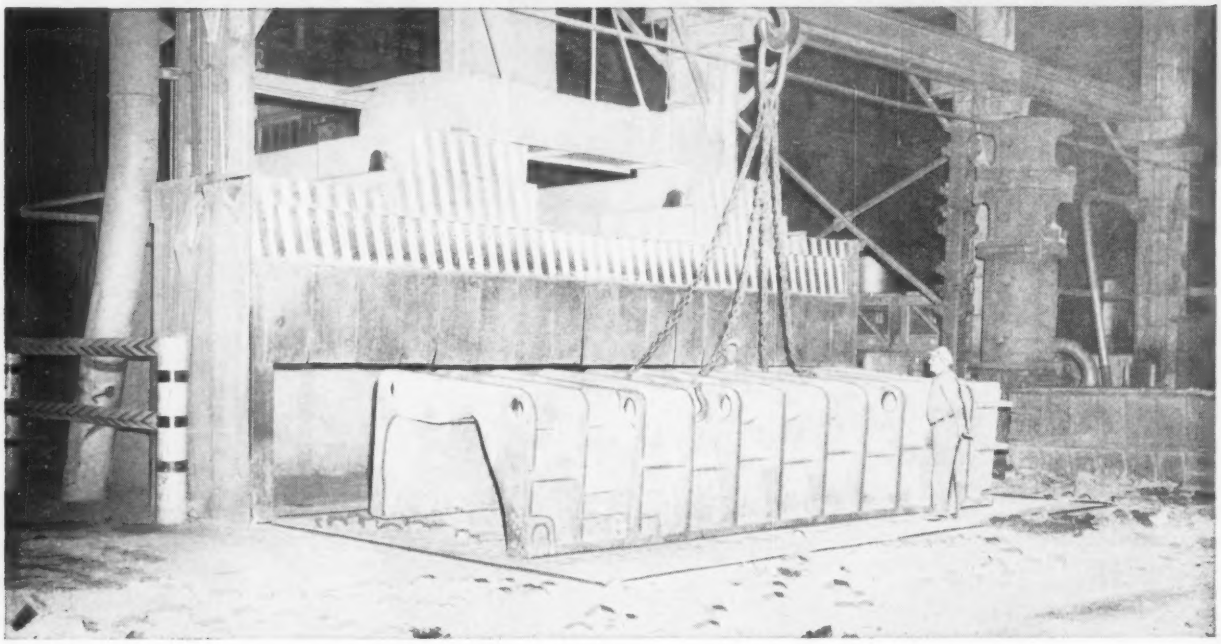
Circle 663 on Inquiry Card—Page 51

problem of shaking out 28-foot solved by SIMPLICITY

the problem: How to clean huge steel mill roll flasks.

- The Place?—The Ohio Steel Foundry Co., Lima, Ohio.
- Additional problems?—The size of the task! Roll flasks are as long as 28 feet—with copes and drags weighing up to 75 tons each with sand.
- What about sand lumps?—These are to be reduced to grain size, and removed to a sand reclaiming system.



The OS-A-VEYOR'S VERTICAL ACTION produces fast shakeout without travel of castings or flasks off of the machine deck. Adjustment can be made for extremely high speed travel, where desired.

flasks in Lima foundry

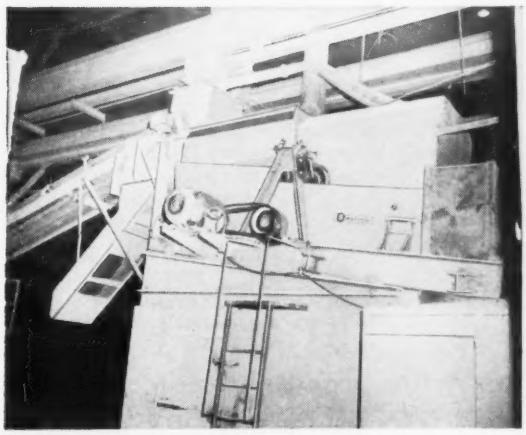
the solution:

Three 8′ 6″ x 12′ Simplicity spring-mounted, Vertical Action shakeouts installed side by side, with decks flush with the foundry floor—providing a shakeout area of 12′ x 26′. Just 2 minutes on the shakeout thoroughly cleans these flasks, where several hours were previously required to clean them manually.

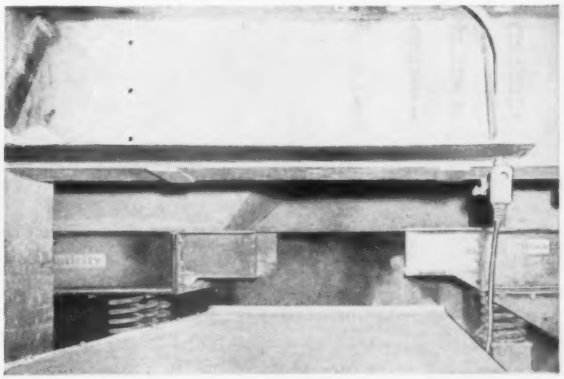
For handling the sand, four Simplicity Vibrating feeders were installed under the shakeouts, providing uniform feeding of the sand through the deck openings to a 3′ x 29′ Simplicity Positive Action vibrating conveyor. A belt conveyor then takes the sand above floor level to a Simplicity Ring Crusher Screen, which reduces the sand lumps to grain size. A bucket elevator then takes the sand to a dry-reclamation system.

A unique feature of this installation is the dust-collector system designed by Mr. James Gaffney, Plant Engineer at The Ohio Steel Foundry Co. The hood is automatically placed over the shakeout by means of an overhead track, with the dust being removed by an overhead duct and blower system. After cleaning, the hood retracts for easy removal of the flask.

For the solution to your shakeout and sand reclaiming problems write us today.



This enclosed 4′ x 12′ Model D Simplicity Ring Crusher Screen has two sets of free-turning crushing rings which reduce the sand lumps to grain size. Available in many sizes, these screens are real money savers!



The four feeders, shown above, receive the sand from six hoppers installed under the shakeout. The conveyor, with partial dust cover, runs perpendicular to the feeders' direction of flow.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario
FOR EXPORT: Brown and Sites 50 Church St., New York 7, N. Y.

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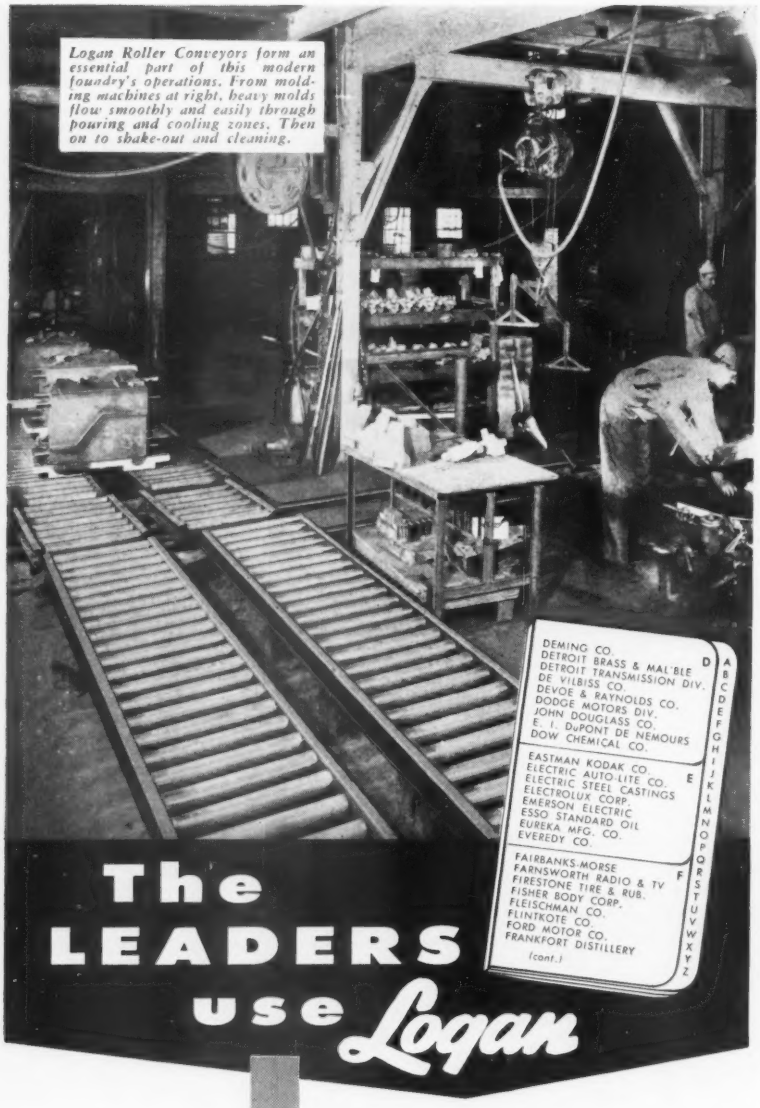
Logan Roller Conveyors form an essential part of this modern foundry's operations. From molding machines at right, heavy molds flow smoothly and easily through pouring and cooling zones. Then on to shake-out and cleaning.
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DETROIT BRASS & MAL'BLE
DETROIT TRANSMISSION DIV.
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FAIRBANKS-MORSE
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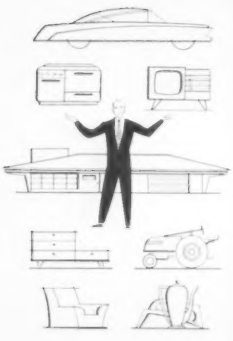

"Staying out in front" often is just as difficult as getting there in the first place. That is one of the reasons why America's leading industries depend on Logan Conveyors as an integral part of their productive processes. Speeding output, enlarging capacity, conserving manpower, and decreasing labor turnover are major Logan functions which you, too, can use to advantage. Write for nearest engineer or for further information.

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Logan Conveyors

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"A Foundry Quiz"

SINCE quiz programs seem to be the order of the day, we had planned to adorn this column with an American Civil War picture showing a rather impressive group of captured cannon. The reader was to be asked to indicate and identify evidence of sand failure on the castings pictured. Because of technical difficulties, we were unable to reproduce the picture with sufficient clarity of detail to serve the purpose we had in mind, and the original plan was abandoned.

Despite this initial disappointment, your sandman's curiosity refuses to be dampened, for he believes that among his readers there are kindred souls, eager to test their powers of observation on this display of century-old foundry art.

The procedure is simple. Go to your nearest library or bookstore and ask to see a copy of **Divided We Fought, 1861-1865,** a pictorial history covering both sides of the American Civil War. You needn't buy or even borrow the book. Just open it to page 432 and study briefly the picture of captured cannon. Then drop a line to your old sandman, at the above address, telling him what you saw of special foundry significance. You thus will indicate clearly the extent of your powers of observation.

A prize for the correct answer? Most assuredly! The prize will consist of that warm glow felt in the heart and seen on the face of a man who knows the answer! In addition, you'll make the old sandman happy to learn how many people indulge in these rambling Meditations and will take the time, trouble and a 2-cent card to say so. Uncle Sam will, of course, be richer by the amount of this postage, and it might serve to

To Help You Produce More and Better GRAY IRON CASTINGS per dollar, specify NEVILLE FOUNDRY COKE

THE hotter, cleaner, more fluid iron you need for top-quality gray iron castings is easier to produce when you're using *Neville* Foundry Coke in your cupola.

The many foundries that use *Neville* Coke regularly find that it consistently provides maximum temperature at the nose of the tuyere. That's because *Neville* is a dense, strong, uniform coke—with more fixed carbon and less ash and sulphur—and carefully processed from clean, washed coals containing a high percentage of Pocahontas.

If you're interested in upgrading the quality and increasing the efficiency of your gray iron castings production, specify *Neville* on your next foundry coke order. Our technical service department will be glad to work right along with your production people.

Neville Pig Iron and Neville Coke for the Foundry Trade

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PITTSBURGH COKE & CHEMICAL CO.
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COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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Pioneered in 1948, backed by 60 years of experience in manufacture of abrasive, Tru-Steel shot was the first high-carbon, fully heat-treated steel shot of tool steel quality.

Tru-Steel has maintained its leadership, with **a special process** to assure solid, round, balanced shot. With sufficient **hardness** to clean quickly and toughness to wear longer, it has five times the life of ordinary abrasive.

Tru-Steel is consistent in chemistry, hardness, grain size and uniform from one lot to another.

It has no equal in general cleaning. Unexcelled for shot peening and sheet or plate descaling.

Available in all SAE sizes in easy-to-handle 50 lb., double walled burlap bags.

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reduce your taxes. What have you got to lose?

Cannon Making — This old Civil War picture has revived, in your inquisitive correspondent, a desire for more satisfying information on the history of cannon making. Of course, when one is about to contemplate any phase of foundry history, he turns instinctively to Bruce Simpson's synoptic history of the casting industry, for Bruce has done the finest job of its kind that I know of. Perhaps, however, it is the fate of the historian, biographer or other writer of supposedly factual material, that he must always, as Bruce does on this point, fall short of satisfying his readers, or even himself. The average man frequently becomes frustrated in the attempt to unearth information not in the common categories.

One would think that cannon making would have been written up from every imaginable angle. But this does not seem to be the case. Using every feasible keyword in a cross-index search, I have pored over the **Encyclopedia Britannica** in a futile effort to glean some fragments of the technical story of making heavy guns.

I would have been satisfied partially to learn where such guns have been cast, how many, their potential firepower and something concerning the nature of their evolution from war to war. Of course, what I really wanted to know, was a few of the secrets in the molder's art of cannon making. But I suppose I must accept my defeat gracefully and acknowledge that the secrets are still secrets, buried with their owners.

Haunts Libraries—I have haunted libraries for some time in the slender hope that in some ancient, dust-covered volume, I might discover a few golden coins of my sought-for treasure. But my hopes are wearing thin. The very hush of the libraries depresses me, and the scholarly librarians glance haughtily at me with a withering contempt that would sear the very soul of a defenseless foundryman!

It is all very confusing. There are thousands of libraries all over the world, filled with millions upon millions of books, in the custody of college-educated librarians, who are crying for more and more of the taxpayers' dollars so that they can build more libraries to house a few million more books: and for what? They can't even give me a teeny-weeny bit of information on cannon making! (If the librarian of Los Angeles County should read this, I'm kidding!)

Seriously, however, I know of no subject that has been more studiously

This superior bonding clay is really something new in the industry. It has a terrific range of applications; indeed, the more you use it, the more uses suggest themselves. Quality, of course, remains consistent because of strict laboratory control. We'll be glad to send you the name of your nearest distributor—who also handles our quality FIRE CLAY and BONDING CLAY. Ask for free samples of our products; after all, these are our best salesmen.

CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

avoided than this phase of the molder's art. During my recent sojourn in Turkey, I was intrigued by the great foundry scrap piles which contained hundreds of ancient cannon, indiscriminately dumped or scattered over the landscape.

There were guns 20 ft or more long, from 2 to 3 ft in diameter at the butt and 10 to 14 in. at the muzzle, which probably weighed up to 20 tons. Some were cast in iron and some in copper or bronze. They came from foundries in Turkey, Russia, and elsewhere.

Baffling Problem—These guns still present a baffling problem to the Turkish foundryman. How can he reduce them to sizes suitable for remelt? They probably could be "bulldozed" with dynamite, but this job certainly would call for an expert in the use of explosives.

Lest my readers be misled, I hasten to insist that I am not of a warlike character—not in the least belligerent. I have a deep and abiding love of humanity and would subscribe to any plan which offered the faintest hope of "beating the swords into plowshares." "Why, then," you ask, "this fanatical curiosity concerning cannon?"

You see, my interest is in the process of production, not necessarily in the product. For centuries, most cannon have been born in the foundry. This "deadly belcher" is a metallic symbol of man's thought and progress (in one direction), and as the complexion of war changed, the ingenuity of the foundryman was taxed to keep pace with the dreams of conquest.

Other Interests—My interest in the exciting and absorbing history of foundry practice is, however, not confined to cannon. Give me the type of information I want, and I'll settle for the ancient, and not so ancient, art of bell-casting or a story of the architectural work for which Louisiana has become so famous or, say, pipe or bathtubs.

We haven't heard much lately about the huge bell of Moscow, which, as far as I have been able to learn, never was explained very logically, and certainly no record of its molding or use is in our libraries. The late Pat Dwyer had to develop his own theory—which he did very successfully—on the technique employed in the casting of the great bronze pillars for Solomon's temple. This was the article that took Pat out of the foundry and seated him at a typewriter.

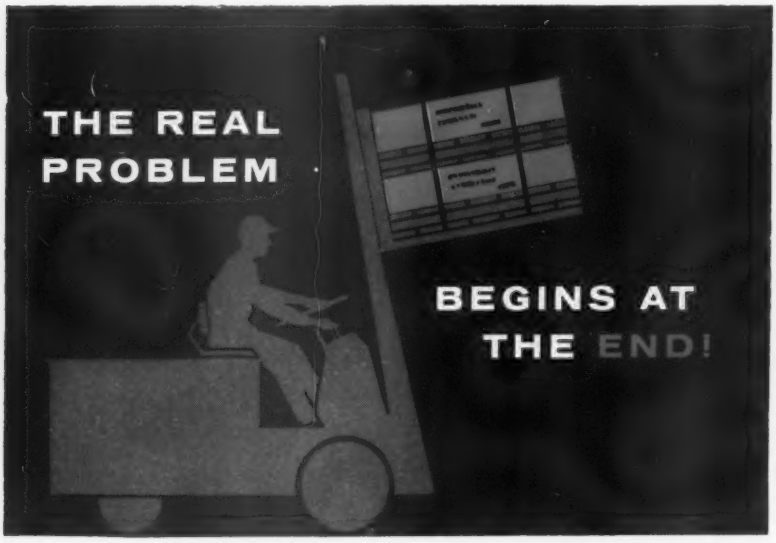
I'm reasonably sure that any foundryman who possesses a grain of curiosity will have his own list of unanswerable questions regarding this historic industry of ours. It would be interesting, if not exciting, to have each subject traced back as far as human records make such a search practicable, just to see what we could come up with.

Who knows? Old Solomon may have preceded us with shell-molding, CO_2, etc. And we might be humbled to learn that the old boy did some things better than we are doing them. What a compromising thought!

Take another look at that cannon picture, fellows — and then let me hear from you—all six of you!

Lists German Manufacturers

The Association of German Machinery Manufacturers, Frankfurt, Germany, has published the 1957 edition of the directory of German machinery and equipment manufacturers. The 800-page, English-language volume includes complete listings of 20,000 producers who are classified in 9000 product categories. It is entitled *Who Makes Machinery?* and is available at $3.50 per copy from Nordeman Publishing Co., 14 East 62nd St., New York 21, N. Y.



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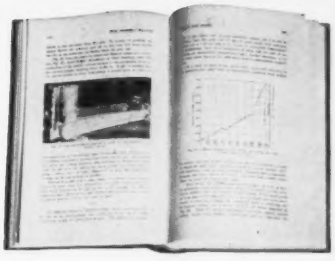
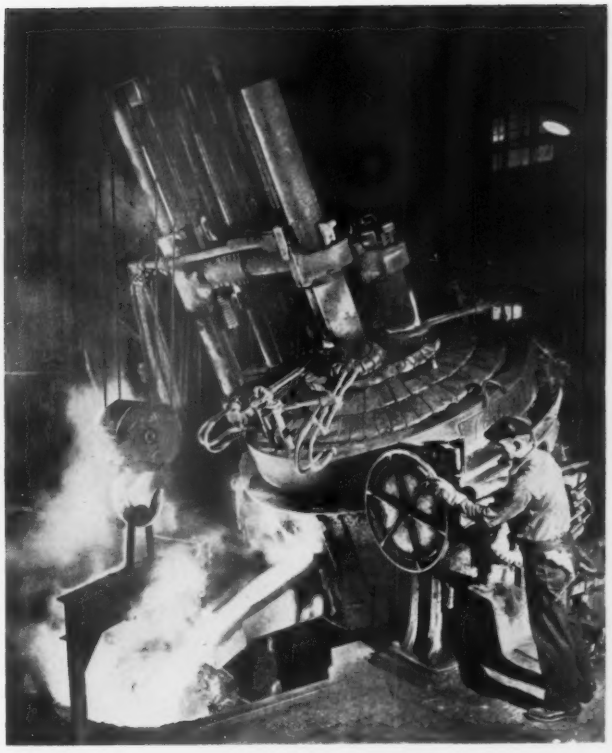
By JOHN HOWE HALL





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Steel Foundry Practice by John Howe Hall is a comprehensive sourcebook covering all phases of modern steel foundry practice. The only up-to-date treatment of the subject available today, it contains practical information on the production problems encountered by foundrymen producing castings in any type of metal.

This book is an invaluable source of data for foundry personnel, educational institutions, technical libraries and suppliers to the foundry industry. A complete cross index provides easy reference to material in any section, and bibliographies at the ends of chapters point out additional sources of information.

Mr. Hall was associated with the production of castings for nearly 50 years as an employee of various producers and as a consulting metallurgist. He was the author of *The Steel Foundry,* which was published in 1914, with a second edition in 1922, and wrote many technical papers. In 1924, Mr. Hall received the first Whiting Medal awarded by the AFS.

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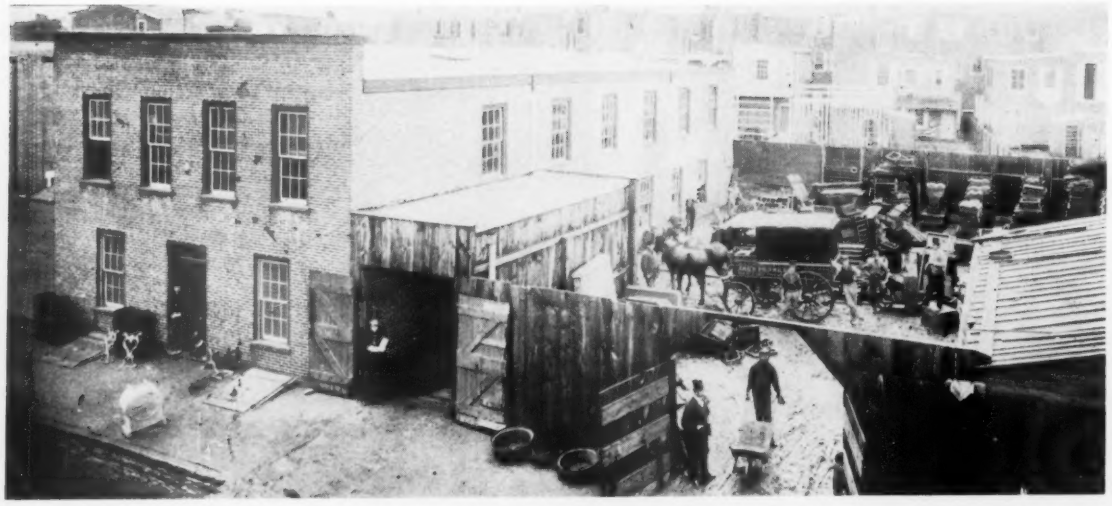
13. Pouring Practice



Perseverance Iron Foundry began operations 100 years ago and still is in the same building. This illustration is from a photograph taken nearly 100 years ago

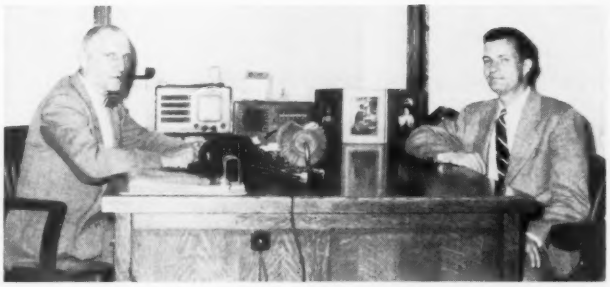
A Philadelphia Story . . . 100 Years Old

ONE HUNDRED years ago, in 1857, a molder, John Field, started the Perseverance Iron Foundry in Philadelphia. The foundry is doing business today at the same location—822 Latona St. in South Philadelphia.

Experiencing financial difficulty early in the foundry's history, Mr. Field accepted aid from Lewis Thompson, who included his son-in-law, Todd, and a Mr. Passmore as partners. Because of his early problems, Mr. Field gave the new business its name "Perseverance"; the full name was Field, Passmore & Todd—Perseverance Iron Foundry.

Mr. Field died in 1874, and a short time later Mr. Passmore passed away, leaving the business to Todd and a Quaker friend, Jones. The name then became Todd & Jones Perseverance Iron Foundry. With little knowledge of the foundry, the two partners ran into trouble, and a local banker took over, placing an accountant, James Lanning, in charge. James Lanning brought four sons into the business, and two remained after his death in 1890. The Lannings purchased the business in 1899 and, following the death of his father, the present president, James N. Lanning, began his career in 1908. Percy L. Lanning Jr., now secretary and treasurer, entered the business in 1929.

The office is located in the same



Left to right are James N. Lanning, president, and Percy L. Lanning Jr., secretary-treasurer, Perseverance Iron Foundry

Employees of Perseverance Iron Foundry line up for a picture behind President James Lanning (in left foreground)

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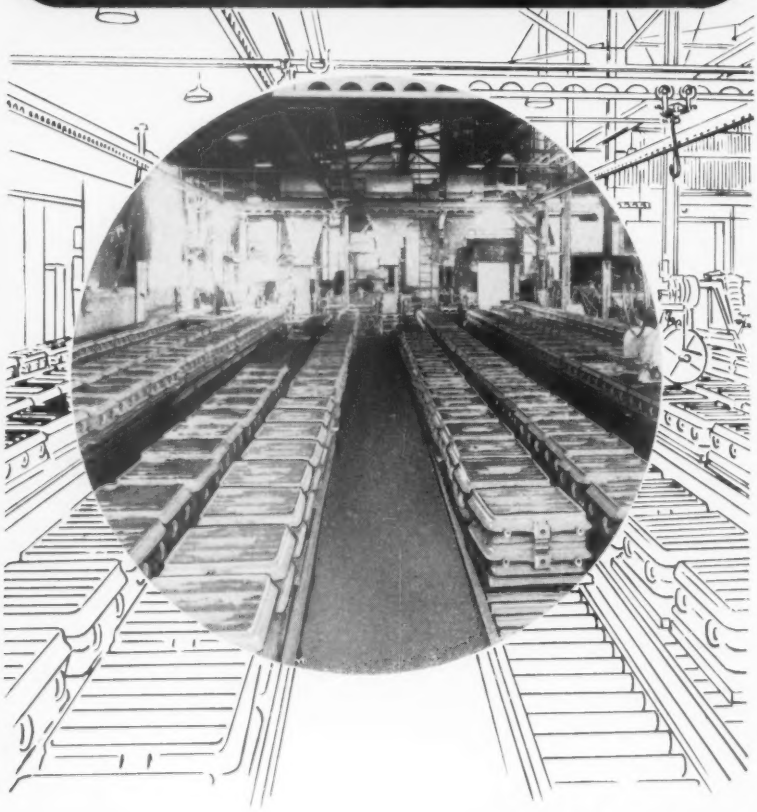

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building in which the business was started 100 years ago, and the present equipment includes a cupola built by the owners in 1885. In the beginning the principal products were stoves and heaters, and castings for the city of Philadelphia. In those days there were more than 20 iron foundries in Philadelphia, more than exist today. Among other interesting products of the past were the three-legged French kettles used by the Indians in the Southwest, ranging in size from 1 pint to 20 gallons. Large quantities of school furniture also were made. These products gradually changed over the years until now the foundry does a general jobbing business, with light machinery castings predominating. The foundry specializes in small lots and quick delivery.

25 Years of Research Marked by Alloy Casting Institute

Twenty-five years of metallurgical research activity were marked June 25 by the Alloy Casting Institute at its annual meeting, Hot Springs, Va. Many important discoveries of use to customers of the industry and to the armed services were described in a review of this research by P. R. Gouwens, chairman of the group's Technical Research Committee. Of particular interest was the report of successful development of a high-strength cast corrosion-resistant alloy for many applications.

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President

PAUL L. McCULLOCH
Vice President

At the close of the meeting, F. M. Fahrenwald, president, Fahralloy Co., Harvey, Ill., was elected president of ACI, succeeding Bradley B. Evans. Paul L. McCulloch Jr., president, Electro-Alloys Division, American Brake Shoe Co., Elyria, O., was elected vice president, and E. A. Schoefer, Mineola, N.Y., was re-elected executive vice president and treasurer. Named directors were Frank Kiper, president, Michigan-Standard Alloy Casting Co., Detroit, and J. B. Dear, sales manager, Duraloy Co., Scottdale, Pa.

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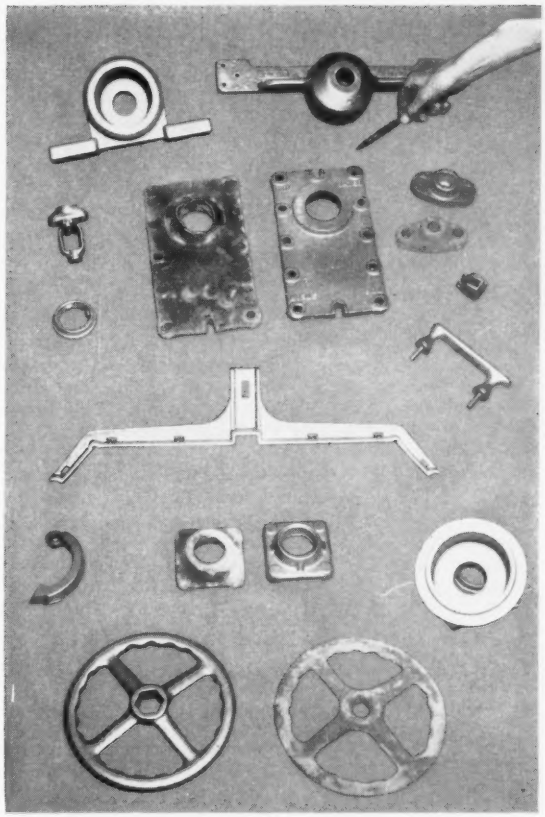

Castings shown here before and after cleaning illustrate the thorough cleaning accomplished with Wheelabrator Steel Shot.

Cleaning an average of 13 tons of gray iron castings a day, the Plainville Castings Co., Westfield, Mass., used to consume 100 lbs. of chilled iron shot every day and 200 lbs. of malleable iron shot every week.

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Obituary

A. Kahn, chief metallurgist, New York Naval Shipyard, died June 20. A graduate of Lehigh University, after receiving his master's degree at Washington University in 1927, he entered the services of the shipyard. Mr. Kahn had been honored by the Navy Department for outstanding services during World War II, in establishing foundry control procedures, development work which had improved foundry yield, and research in radium radiography.

Walter C. Kerrigan, 65, since 1954 assistant to the president, International Nickel Co. of Canada Ltd., and its U.S. subsidiary, International Nickel Co., New York, died July 16. He joined the nickel sales department of the company in 1930, and became its manager in 1946. The following year he was elected vice president of International Nickel Co., and vice president-general sales manager in 1952.

Conrad F. Nagel Jr., 65, retired vice president, and chief metallurgist, Aluminum Co. of America, Pittsburgh, died July 5. A graduate of Cornell University, he joined the company in 1915 as assistant to the chief chemist. Mr. Nagel became chief metallurgist in 1944 and a vice president in 1952. He retired early this year.

Kershaw Harms, 58, vice president, American Smelting & Refining Co., New York, died July 12. With the company for 40 years, he was manager of the Perth Amboy, N. J., plant for 14 years. Since 1954 he had been general manager of the Federated Metals Division, and became its vice president early this year.

David E. Linn, 51, sales service manager, Corn Products Sales Co., New York, died Aug. 6. He joined the company in 1930 and had previously served as assistant to the research director at Edgewater, N. J. He became manager of sales service in 1956.

Mrs. Joseph Sackenheim, for many years registered nurse in the first-aid department of Hamilton Foundry & Machine Co., Hamilton, Ohio, died recently.

Edward J. Bothwell, 57, in charge of the distributor sales section, International Nickel Co., New York, died July 24. He was a research assistant at the company's research laboratory in Bayonne, N. J., from 1915 to 1923, when he was transferred to the Development and Research Division, New York. In 1928 he joined the nickel sales department, specializing in the sales development of nickel cast irons. Mr. Bothwell was active in committee work of the Gray Iron Founders' Society.

Raymond H. Queeman, 65, since 1943 purchasing agent, Wehr Steel Co., Milwaukee, died Aug. 9. He was associated with the former National Brake & Electric Co. until 1930 when he became office manager, General Foundries Co., Milwaukee.

Alfred P. Jaeschke, 74, owner of the former Jaeschke Bros. Foundry Co., Milwaukee, died July 30. He opened the Jaeschke foundry in 1905 and when it was acquired by Koehring Co. in 1921 Mr. Jaeschke became superintendent. He retired in 1941.

Donald A. Comes, 62, vice president and general sales manager, Farrel-Birmingham Co., Ansonia, Conn., died July 14. Mr. Comes had been with the company since 1922, when he became its sales representative in New Jersey.

David A. Crawford, 77, chairman of the board, Michiana Products Corp., Michigan City, Ind., died July 22 in Florida. He retired as president of Pullman Inc. in 1949.

Ralph R. Neat, for nearly 30 years superintendent, Buckeye Brass & Mfg. Co., Cleveland, died July 16.

F. E. Oppler, vice president, Keystone Abrasive Wheel Co., Pittsburgh, died Aug. 4.

Book Review

Metal Statistics 1957, Norbert J. Langer, editor, cloth, 4 x 6 in., 856 pages, published by American Metal Market, 18 Cliff St., New York 38, N. Y. Price $3.50 in U.S.A. and Canada. Other countries $5.

Fiftieth anniversary edition devotes over 400 pages to statistical data on production, consumption and prices of ferrous and nonferrous metal products, raw materials and precious metals. General economic data on freight car loadings, automobile production, industrial production, foreign commerce, national income and other data are included.

Circle 673 on Inquiry Card—Page 51

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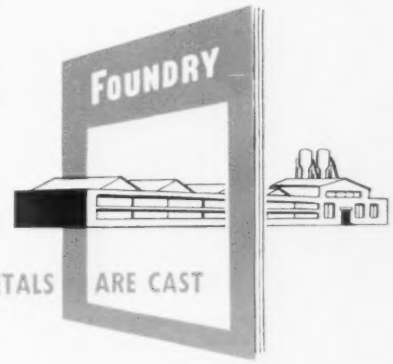

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Circle 675 on Inquiry Card—Page 51

News Views

TAKING THE CHAIR: New president of the Institute of British Foundrymen is John Blakiston, left, to whom H. J. V. Williams, retiring president, turned over the chair at the annual convention of the IBF at Harrogate, England, in June

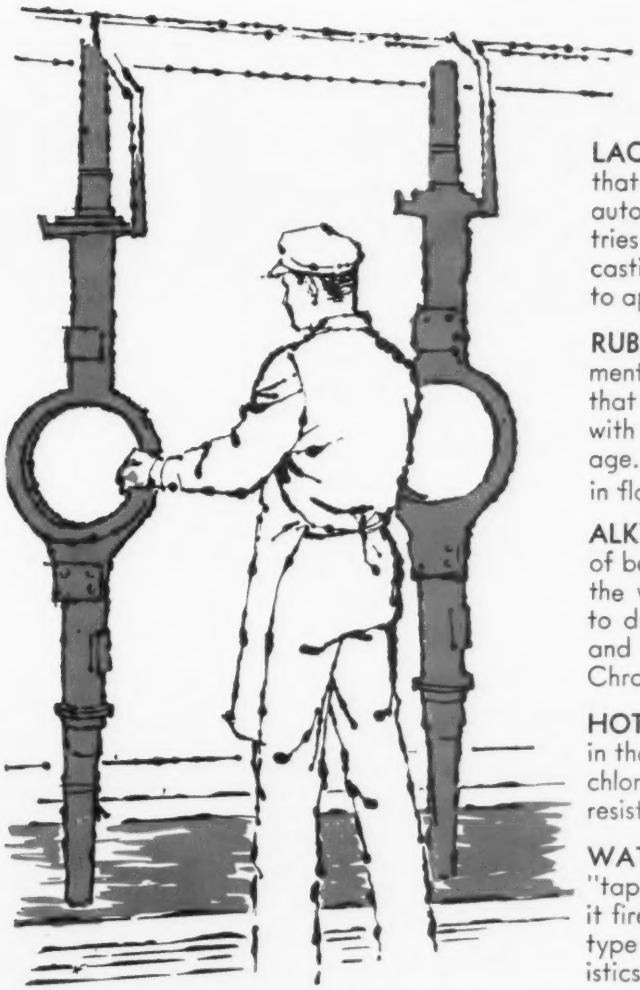
LOOKING FORWARD: Research and development activities of Electrode Division, Great Lakes Carbon Corp., New York, will expand 50 per cent on completion of its new Research and Development Building at Niagara Falls, N. Y. Left to right, at starting ceremony, are Raymond C. Newman, chief engineer; Bruce L. Bailey, technical director; Leslie H. Juel, manager of research and development; and Edward D. Burton, plant manager

30 YEARS OF SERVICE: Thirty years with Ford Motor Co. were marked recently by Charles H. Patterson, center, who was presented with a gold pin by Ernest R. Breech, board chairman, right. Mr. Patterson directs operations of nine foundry and engine facilities which employ more than 25,000 persons. R. H. Sullivan, Ford group vice president, watches from left

COST ACCOUNTING MEETING: Cost accounting and the formation of midwest cost groups of the Non-Ferrous Founders' Society brought these foundry executives together recently at the Orrington Hotel, Evanston, Ill. In addition to planning cost groups in Chicago, Milwaukee and St. Louis, the meeting considered standardization of forms, credit, terms and conditions of sale, ratio analysis and insurance. On June 1, the society moved offices to the University Building, Evanston

if it's sealer information you desire, look to

TOUSEY*



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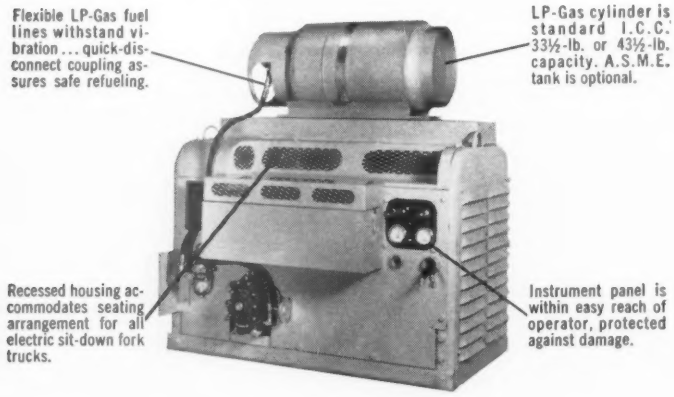
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Cleanliness Is Answer to Industrial Dermatitis

How To Protect Workers Exposed to Irritants

By Dr. W. Schweisheimer

CLEANLINESS is our strongest ally in the war on occupational dermatitis—that is, skin trouble originating from work and allied activity — according to Dr. Louis Schwartz, longtime director of the U. S. Public Health Service and expert on occupational skin diseases. In a recent publication, he described his experiences in various industrial plants employing a total of about 117,000 workers and gave important advice on how to prevent dermatitis.

Personal Cleanliness Is Required—The place to start a program to minimize occupational skin troubles is in the design and construction of a plant. Irritant chemicals should be enclosed, and workrooms should be ventilated adequately. Personal cleanliness, however, appears to him the single most important measure. And environmental cleanliness (good housekeeping) can be almost as important. It not only builds morale, but also lessens the chances of direct contact with an irritant. Dirty underclothes and work clothes and failure to clean the skin properly after work or after it has been soiled with irritant chemicals are important factors in causing dermatitis.

Dr. A. J. Fleming, of DuPont, also stresses the necessity of personal cleanliness as a preventive measure. Proper personal hygiene is, he says, our best defense against chemical dermatitis. When the skin has become contaminated with a chemical, it is not good practice to postpone removal of the substance. Plenty of water and soap should be readily available, and one or two minutes will suffice to remove the irritant material from the skin.

Prevention of Contact—Chemicals are a common cause of skin irritation and dermatitis, but there are other causes as well: mechanical action (friction or repeated pressure); physical agents (heat, cold, electricity); sunlight; ultra-violet radiations; x-rays or radiation from radioactive materials; and biological agents such as bacteria, funguses and parasites.

All prevention of industrial dermatitis attempts to prohibit skin contact with possible irritant substances. If contact occurs, we try to remove them from the skin as fast as possible. Protective clothing and protective ointments accomplish the pre-

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You can depend upon this very comprehensive line of core oils to give excellent performance in the majority of your core work. Occasionally very exacting requirements will call for a special core oil. Our technical and field staff will gladly work with you to develop an oil to answer your particular problem.

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A series of fast baking core oil, producing cores with high tensile and hot strength and excellent collapsibility. You can depend on any one of the oils from the JET BOND SERIES to produce cores with smooth, hard surfaces, strong sharp edges, resulting in HIGHER QUALITY CASTINGS.

JET LIQUID RESIN SERIES

A series of compounded liquid resins, producing cores with exceptionally high tensile strength and fast baking properties. The JET LIQUID RESIN SERIES will prove exceptionally valuable in the large production foundries by eliminating core room bottle-necks, along with increased core room production. It will also step up baking time considerably on the large chunk cores where baking is generally a problem.

TYKOR LIQUID CORE COMPOUND

A concentrated liquid core compound, generally used in conjunction with core oil, to increase the surface hardness of cores, and, at the same time, produce softer centers. Tykor has been proven particularly valuable especially where shrinkage cracks are a problem, generally caused by poor collapsibility.

JET DRI-BINDER

A heavy duty dry core binder recommended for steel and gray iron castings, particularly where metal erosion and metal penetration is a problem. JET DRI-BINDER users report cleaning costs reduced considerably, very low scrap and better casting finish.

Address inquiries to

SWAN-FINCH
PETROCHEMICALS
5849 WEST 66th STREET
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SWAN-FINCH FOUNDRY PRODUCTS

- JET CO_2 BOND Series silicate binders
- JET CO_2 BOND Stabilizer
- Super Jet Drier
- Jet Liquid Parting
- Jet Sand Conditioner
- Jet Resin A

Working samples and literature on Swan-Finch Foundry Products will be sent to you on request for test purposes in your own foundry. A qualified Swan-Finch engineer will gladly help you select one of our foundry products for your particular requirements.

vention of contact. Industrial skin cleaners remove the irritant substances from the skin.

Protective clothing must be impervious to the irritant material, and it should be light and comfortable. No tears or holes are allowed in gloves, sleeves, coveralls, aprons, etc., and at least two sets of protective clothing are needed for each worker exposed to irritants.

Protective Ointments or Creams—Workers like to use protective ointments. The thin film they leave on the skin acts as a barrier against irritant substances. Dr. Schwartz divides protective ointments into three main types—vanishing cream and water-repellent and solvent-repellent varieties.

Simple vanishing cream contains soap, which remains in the pores of the skin and thus facilitates removal of soil during washing.

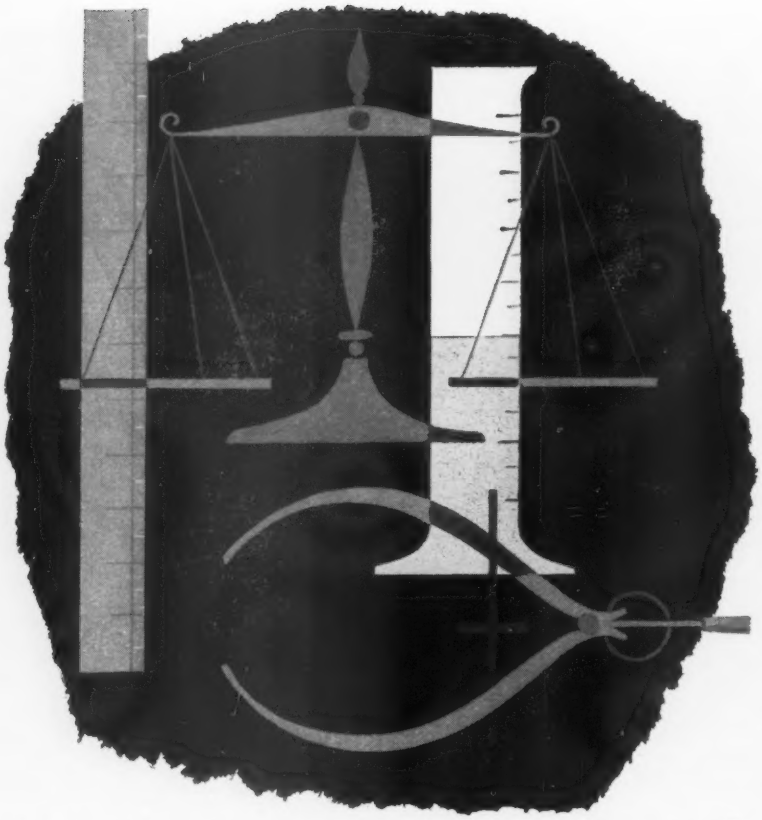
Water-repellent ointments leave a thin film of a water-repellent substance such as lanolin, wax, petrolatum, silicones, etc., on the skin. The film prevents water-soluble irritants such as acids and alkalies from contacting the skin. Silicones, which have come into recent use as protectives, are preferred by the workers when they are less greasy, but the more greasy silicones are more water-repellent.

Solvent repellents contain oil and solvent repellents such as sodium alginate, methyl cellulose, tragacanth, etc. Lanolin has both oil-repellent and water-repellent properties.

In addition, there are special types of protective ointments. Protective ointments are applied before work, washed off before lunch, usually reapplied after lunch and washed off again before the worker goes home. They should be placed in conveniently located dispensers in washrooms and over washbasins, or they may be given to workers in individual jars or tubes.

Prevention of Oil Dermatitis—A discussion on how to prevent oil dermatitis was carried recently in the *Journal* of the American Medical Association. Oil dermatitis is due to poor hygienic conditions and can be prevented by proper hygiene, including an educational program for employees.

A program of the following measures should prevent and/or clear up the situation: 1. Insistence on personal cleanliness, which requires clean clothes, adequate washing facilities and the use of liquid surgical soap. 2. Use of paper towels instead of cloth towels. 3. Use of water-soluble protective creams and other protective equipment, as indicated. This program is an inexpensive and satis-



how do you measure economy?

economy is not measured by price alone!

PROVED OVER THE YEARS

When you are concerned with metal abrasives there are many yardsticks that must be applied to truly measure economy.

How long will an abrasive last? How long before it breaks down into fines and becomes inefficient?

How destructive is the abrasive to machinery and equipment?

How efficiently does it perform and what is the time cycle for good performance?

To sum it all up — the economy of using any abrasive can be measured by the **cost per ton of metal cleaned!**

On every count, Malleabrasive has proved its superiority over the years in hundreds of plants.

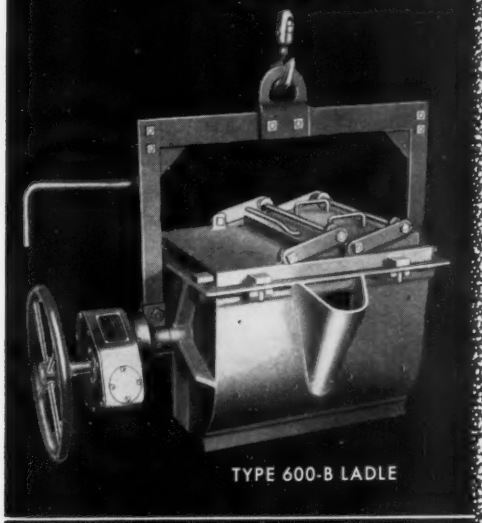
If you want to improve the economy of your blast cleaning operations — check Malleabrasive.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO ®

1907—Fiftieth Anniversary—1957

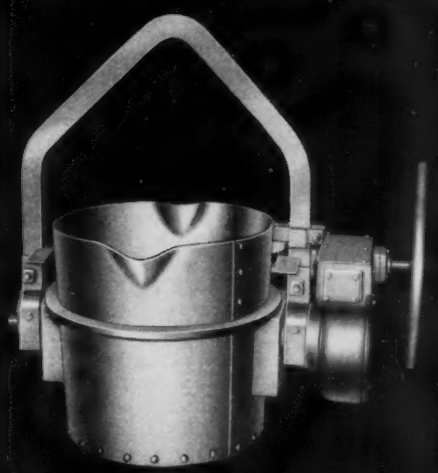
Industrial Molten Metal Handling Equipment



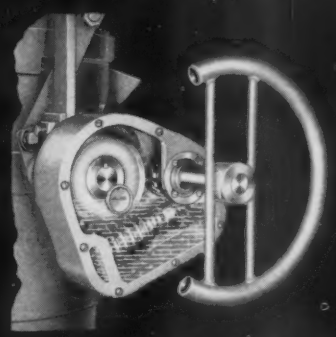
TYPE 600-B LADLE

for exceptional efficiency and dependability under heaviest production schedules

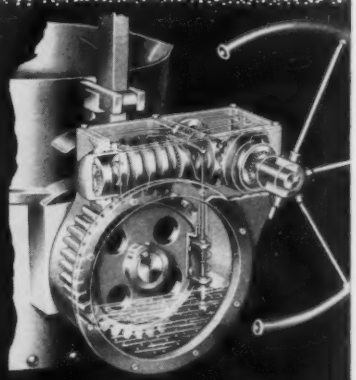
Industrial Equipment Co. manufactures a wide range of geared ladles for every type of foundry service. For light duty pouring, specify Industrial ladles with Bantam worm gearing . . . for heavy duty pouring specify Industrial ladles with the exceptionally strong and dependable Timken worm gearing. The design and construction of both types of Industrial's gearing assemblies assure outstanding ease of operation, accurate pouring control and long trouble-free service. Binding as a result of heat distortion is eliminated—even if ladles are in constant use without a chance to cool. In addition to the many types of standard ladles, Industrial Equipment Co. also develops custom ladles for special applications.



TYPE 592-T LADLE



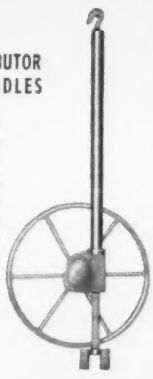
BANTAM WORM GEARING



TIMKEN WORM GEARING

INDUSTRIAL'S DISTRIBUTOR FOR POUR-OFF LADLES

Combines greater strength with less weight, one hand control, ease of pouring, trouble-free operation and greater safety to boost foundry production and lower costs.



TYPE U CRADLE CRUCIBLE TONGS

Design features . . . including self-adjusting contact pads . . . assure greater safety, ease of handling and efficiency. Seven types available for all makes and sizes of crucibles.

Industrial EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

Write today for our complete catalog, with details of all our products—Ladles . . . Bowls . . . Shanks . . . Bails . . . Tongs

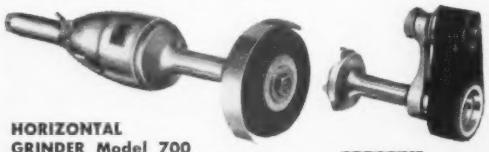
MANUFACTURERS OF CONSTANTLY IMPROVED FOUNDRY EQUIPMENT SINCE 1900

CUT GRINDING TIME AND COSTS...

NEW!

VERTICAL GRINDER Model 700-V

Designed for easier flat or curved surface grinding, sanding, and wire brushing. Packs plenty of power . . . adjustable speed to 6000 R.P.M. Two handles for convenience in maneuvering . . . safe control. Weighs only 11 lbs. 6" cup wheel or brush, 7" or 9" sanding disc.



HORIZONTAL GRINDER Model 700
Balanced design and long shank for grinding or snagging around intricate construction. Controlled speeds up to 6000 RPM. Lightweight (only 12 lbs. without wheel) reduces operator fatigue. Models for 6" or 8" grinding wheel.

ABRASIVE BELT ATTACHMENT
For fine finishing on dies, molds seams, contour surfaces. Attaches easily to Models 600 and 700, uses 2" wide belt.

Designed for maximum portability . . . built for rugged continuous service. Airetool's "Power Seal" air motor is economical to operate and maintain . . . delivers ample power and even speed. It won't stall under severe loads or heat up from constant use.

Grinder housings cast from special aluminum alloy for extra strength and lightness.

For complete information on how Airetool grinders can cut your grinding costs, contact your Airetool representative or write for literature.

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powerful... light-weight... air-powered... AIRETOOL GRINDERS

factory way of controlling oil dermatitis.

Another expert in the *Journal* emphasized the need to remove twice a day any cutting oil that may have contaminated the skin—namely, before lunch and at the end of the work day. This measure can be accomplished best with a mild soap and plenty of water. The use of protective creams may assist in emphasizing the general personal hygiene of the worker.

Dr. Raymond R. Suskind, Kettering Laboratory, University of Cincinnati College of Medicine, recently described the clinical effectiveness of a silicone-bentonite cream in the effective management of industrial dermatitis. The cream under study had considerable protective value clinically against light petroleum oils and irritants such as rust preventives dissolved in such media and against insoluble cutting oils, soluble coolants, watery solutions of sulfuric acids and metallic dusts.

Dr. Suskind clinically observed relative protection against low-boiling petroleum fractions when skin exposure was intermittent and the solvent contained a small amount of light petroleum oil. No clinical protection was observed with frequently repeated skin contact with gasoline, naphtha, petroleum spirits, lacquer thinner, etc.

The types of exposure influenced most beneficially by silicone cream were the following: 1. Irritating corrosion inhibitor dissolved in light turbine oil. 2. Decreasing solvents such as xylene and heavy naphtha when used intermittently (there was little effect when contact with the skin was continuous or frequent). 3. Lubricating oil. 4. Insoluble and soluble cutting oils. No benefit was seen when the cream was used to avoid the effects of immersion of the hands in kerosene or water glass or of injuries to the skin.

Washing Facilities—Washing facilities, according to Dr. L. Schwartz, should be placed strategically so that no worker need walk more than 100 ft to get running hot and cold water, a proper industrial cleaner and sanitary towels. Management should, and in some states must, supply cleaner and towels. The type of cleaner furnished depends on the type of industrial soil to be removed. Where showers are needed, enough shower baths should be provided so that workers do not have to wait too long to use one. No soap should remain on the skin after washing since it may irritate the skin. Water remaining on the skin may cause chapping, especially in

No. 8® GRAPHITIZER

TREATS GREY IRON EFFECTIVELY FOR LESS THAN 10¢ PER TON!

Thousands of foundries are already employing No. 8 because it is such an amazingly simple and accurate graphitizer. No. 8 is a powerful inoculant. It plants graphite *throughout* the molten metal. No. 8 gives castings a higher machinability rating. It reduces chill and hardness in thin sections and improves wear and shock resistance. No. 8 makes castings more metallurgically uniform and, most important of all, No. 8 graphitizer *substantially reduces the cost of metal control* (cost figures in several foundries are below 10¢ per ton of metal treated). No. 8 is easy to apply by funnel or envelope method. As the photomicrographs shown here indicate, No. 8 is effective for special metallurgical control. From every standpoint it will pay you to use No. 8, regularly. For further details write for Engineering Bulletin No. 2.

Base Iron

Photomicrograph from broken half of 1.25 arbitration bar of gray iron not treated with No. 8 Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties: Transverse Strength 2,497 lbs. (wedge bar) • Brinell Hardness 229 (wedge bar) • Total Chill Depth 41/32 in., Clear Chill 26/32 in. • Deflection 0.23 in.

Treated Iron

Photomicrograph from broken half of arbitration bar of same base iron treated with 1 lb. per ton of No. 8. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties: Transverse Strength 2,970 lbs. (wedge bar) • Brinell Hardness 217 (wedge bar) • Total Chill Depth 13/32 in., Clear Chill 10/32 in. • Deflection 0.31 in.

Note how the iron treated with No. 8 has increased in deflection. Usually iron treated with No. 8 will show an increase from 10% to 30% in deflection over the base iron value—this means less cracked castings and more serviceable metal.

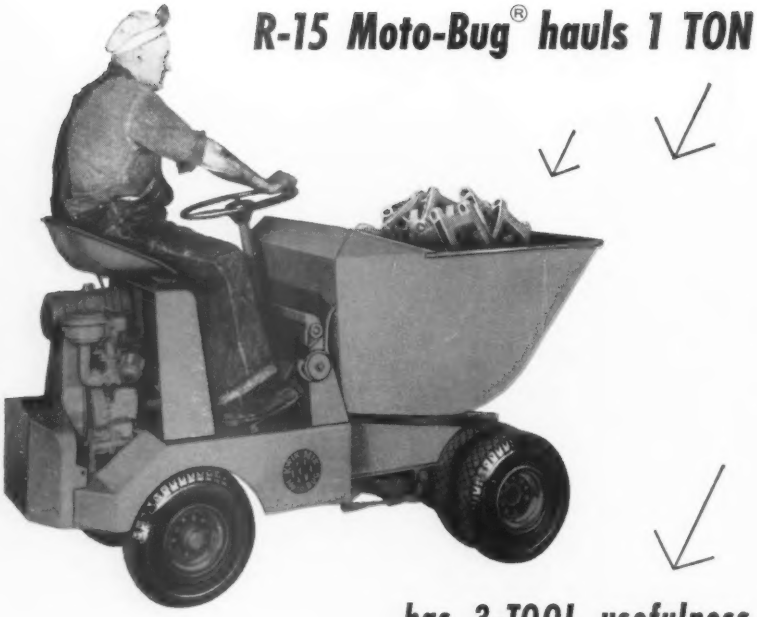
GF240-1

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

R-15 Moto-Bug® hauls 1 TON



has 3-TOOL usefulness

Have you checked lately into the steadily-rising costs of material handling? There's a practical, low-cost answer for your foundry in one of these *multiple-tool* Moto-Bugs that hauls, lifts, unloads, stacks any materials or supplies. The 4-wheel R-15 carries 2,000 pounds of sand, scrap, slag, cores, flasks, small castings in 15 or 18 cu. ft. hopper, or on interchangeable 4½-foot platform. Fork lift attachment handles ¾-ton load at 7-foot height.

No clutching, no shifting

You get a high rate of production with every attachment, because the R-15 travels up to 12 m.p.h., forward and reverse — climbs 25% ramps with 2,000-lb. hopper load. Turning radius is short, only 82 inches with hopper or platform — 84 inches with fork lift. *There's no clutching or shifting.* All travel is controlled by foot accelerator. A simple *power-flow* transmission *automatically* regulates power output in direct ratio to power and speed requirements. Find out what low-cost Moto-Bug can do for *you.* Ask Kwik-Mix distributor to demonstrate — or write us *today.*

Change R-15 Moto-Bug from hopper body to 4½-foot platform, and you have a heavy-duty, 1-ton truck. It also has 780-lb. drawbar pull for towing wagons, carts.

Low-cost fork lift attachment for R-15 Moto-Bug has 1500-lb. capacity (at 15-in. load center), 7-ft. lift, power-tilt mast, adjustable forks. A smaller size Moto-Bug is also available with multiple tools.

mail to: KWIK-MIX COMPANY PORT WASHINGTON, WIS. Division of Koehring Co.

Send us literature on R-15 Moto-Bug with: ☐ hopper ☐ platform ☐ fork lift

NAME_____ TITLE_____

COMPANY_____ DIV._____

STREET_____

CITY_____ STATE_____

☐ Also interested in smaller multiple-tool S-10 Moto-Bug. KM774 FO

cold weather. All moisture therefore should be removed carefully.

Emollients (to soften the skin) are recommended after the final washup of the day, to help to avoid defatting of the skin. Emollients contain lanolin, glycerin or other substances that make the skin pliable and prevent chapping until the skin itself has had a chance to renew the secretions taken out by industrial exposure. Emollients are particularly necessary for workers with dry, thin skin who are engaged in occupations which require frequent immersion of hands.

Education of Employees — No amount and no quality of protective equipment is of any use to workers if they do not know how to use it. So an important aspect of any anti-dermatitis program is to teach them to use industrial cleaners, protective ointments and other items properly. This education can be achieved by posters and placards in workshops, washrooms and toilets. In addition, at regular safety meetings, prevention of industrial dermatitis should be a major topic. Periodic inspection of workers' hands helps to uncover cases of dermatitis in the early stages and makes workers conscious of the possibility of contracting dermatitis.

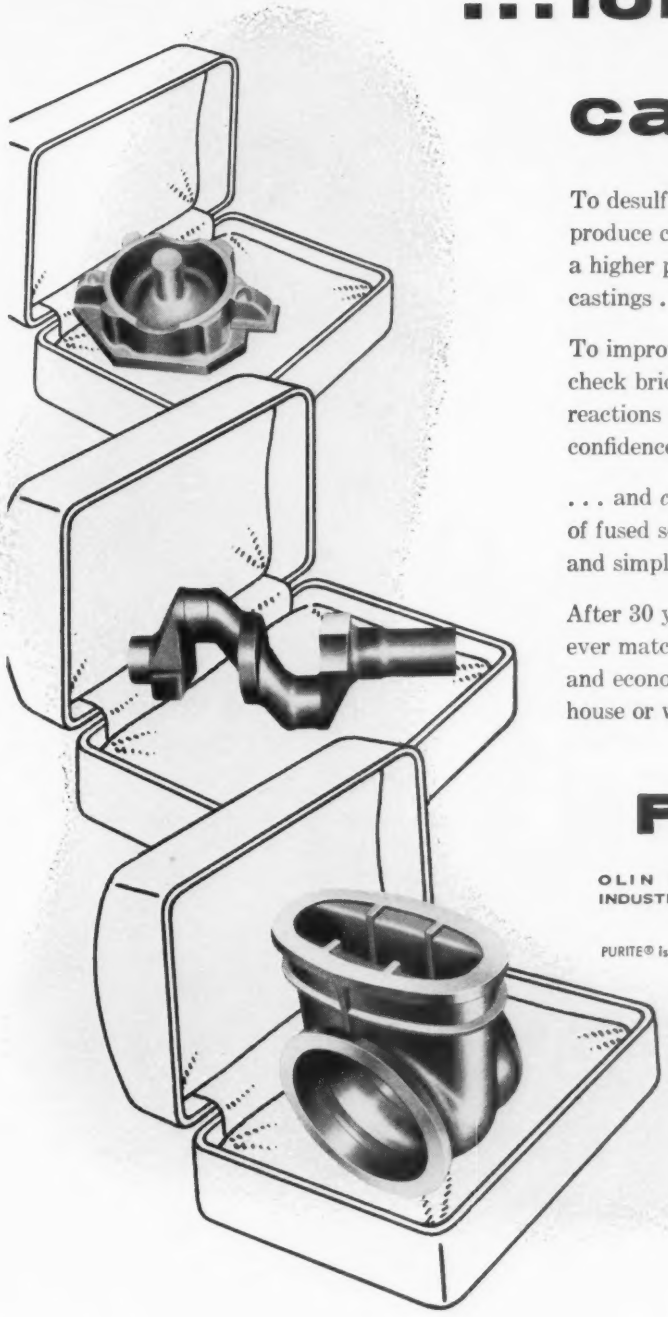
Industrial Accidents Decrease, But Rate In Foundries Rises

Workers employed by member companies of the National Safety Council had fewer injuries during 1956, and those they had were less severe, according to advance data from the 1957 edition of *Accident Facts,* the council's annual statistical yearbook.

Of the 40 basic industry classifications, 30 either reduced or did not change their frequency rates. Half cut or did not change their severity rates. The average injury frequency rate for employees of all industries submitting company reports to the council was 6.38 in 1956, a reduction of 8 per cent from 1955. The frequency rate is based on the number of disabling injuries per 1 million manhours worked. Severity rate is time charges in lost days per 1 million manhours.

The foundry industry was one of ten which increased both its frequency and severity rates. The former rose 9 per cent to 10.32 and the latter 8 per cent to 876. The industry ranked ninth from the bottom, or in the lowest quarter of the 40 industries reported.

...for quality castings



To desulfurize iron to uniform specifications . . . to produce clean, quiet-pouring metal . . . to insure a higher percentage of strong, machinable castings . . . *count on* Purite.

To improve melting operations in the cupola, to check bridging, increase fluidity, speed combustion reactions . . . to permit use of high sulfur scrap with confidence . . . *count on* Purite.

. . . and *count out* Purite by the pig! The 2-pound pigs of fused soda ash eliminate weighing or measuring and simplify storage operations.

After 30 years of profitable performance, nothing has ever matched Purite for convenience, effectiveness and economy. Check your foundry supply house or write—

PURITE

OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.

PURITE® is a trademark

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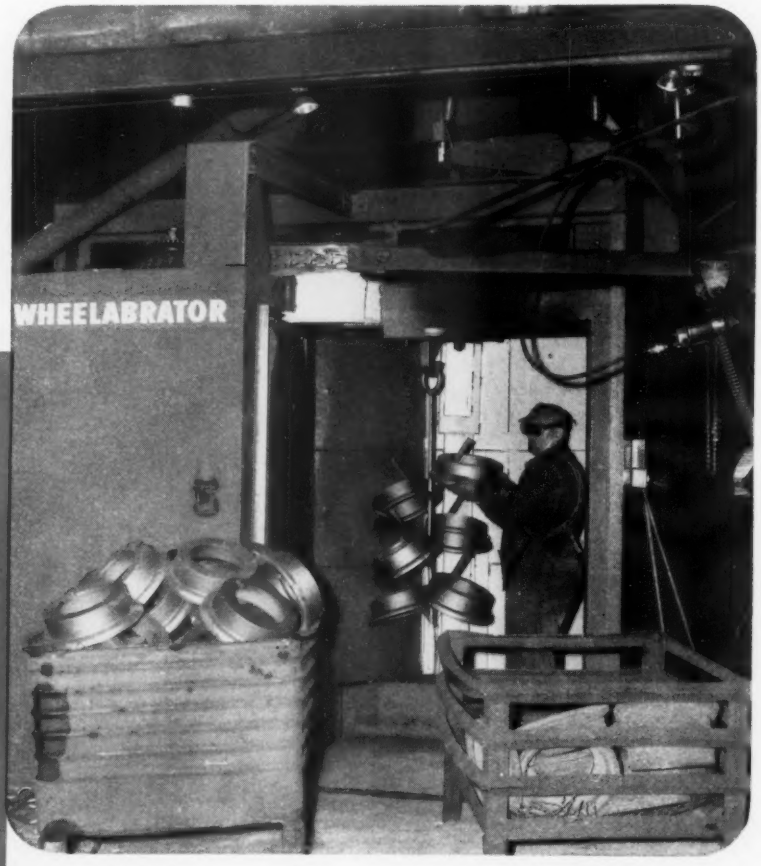
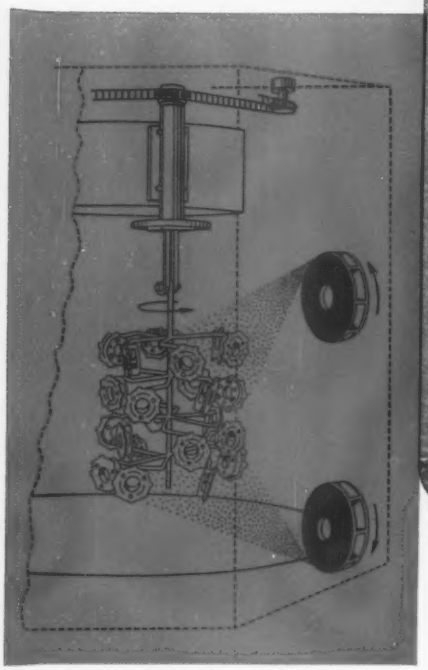
WHEELABRATOR®

spinner hanger cabinet

. . . simple solution to special cleaning problems





Write today for information on how a Spinner-Hanger Cabinet or other Wheelabrator machine designs can answer your problem of rising operating costs.

Creative engineering plus the unparalleled productivity of the airless Wheelabrator brings another ingenious, cost-cutting solution to complex cleaning problems in the foundry. It's the Wheelabrator Spinner-Hanger Cabinet for cleaning a wide range of sizes, weights and shapes of castings. For instance, one of these Cabinets at Benton Harbor Malleable Industries, Inc., is cleaning several hundred different sizes of castings, weighing up to 150 lbs., that would have required at least two different types of machines. The work-carrying hanger, illustrated at left, holds 2 to 12 castings and rotates in several compartments to obtain thorough cleaning. This new design offers tremendous possibilities for savings in jobbing and production foundries alike.

WHEELABRATOR CORPORATION

505 South Byrkit Street **Mishawaka, Indiana**

WORLD'S LARGEST MANUFACTURER OF AIRLESS BLAST CLEANING EQUIPMENT

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1955	827,162	165,482	298,349	355,203	.....
1956					
May	65,786	15,570	19,699	29,814	102,121
5 mo.	354,699	78,320	111,724	161,763	.....
June	58,189	13,448	19,067	25,027	102,068
July	52,955	12,398	16,388	23,491	106,620
Aug.	61,407	13,100	18,067	29,553	109,352
Sept.	62,503	12,354	17,855	31,640	111,785
Oct.	74,209	14,389	21,120	37,782	110,818
Nov.	69,741	14,333	20,673	33,929	113,356
Dec.	67,333	13,391	20,557	32,931	118,185
Total	801,036	171,733	245,451	376,116	.....
1957					
Jan.	72,999	14,201	20,963	37,194	116,088
Feb.	69,451	13,366	21,707	34,311	107,869
Mar.	74,527	13,914	22,974	37,521	107,963
Apr.	68,284	14,287	20,376	33,493	98,113
May	65,108	12,705	20,708	31,602	94,748
5 mo.	350,369	68,473	106,728	174,121	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1955	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Apr.	83,320	47,064	72,763	41,449	10,557	5,615	99,573
4 mo.	357,356	202,414	308,154	175,671	49,202	26,743	.....
May	80,138	51,053	69,593	44,424	10,545	6,629	93,677
June	75,635	45,022	66,300	26,791	9,335	5,513	86,247
July	54,340	31,300	45,977	26,881	8,363	4,419	92,078
Aug.	74,422	43,479	62,867	36,759	11,555	6,720	91,883
Sept.	69,380	41,902	59,071	35,534	10,309	6,368	92,553
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....
1957							
Jan.	85,977	51,508	71,689	43,401	14,288	8,107	93,886
Feb.	78,028	46,729	65,411	39,590	12,617	7,139	90,725
Mar.	78,013	48,311	64,560	23,915	13,453	7,666	89,431
Apr.	80,271	51,320	65,990	42,810	14,281	8,510	83,116
4 mo.	322,289	197,868	267,650	149,716	54,639	31,422	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1955	1,008,898	905,867	63,111	.....
1956				
May	89,188	80,105	5,448	58,789
5 mo.	457,425	408,892	29,605	.....
June	78,921	70,260	5,052	55,019
July	60,926	55,027	3,193	59,661
Aug.	77,619	70,479	3,805	56,364
Sept.	72,109	64,887	3,930	56,990
Oct.	81,049	73,058	4,104	54,363
Nov.	72,866	65,022	4,114	52,643
Dec.	65,198	57,929	3,769	56,556
Total	966,113	865,554	57,572	.....
1957				
Jan.	82,025	73,202	4,510	57,422
Feb.	72,084	64,346	4,188	54,133
Mar.	77,418	69,258	4,445	49,135
Apr.	77,167	69,141	4,316	48,148
May	75,347	67,251	4,421	46,791
5 mo.	384,041	343,198	21,880	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1955	27,854	25,294	....
1956			
May	3,021	2,801	7,293
5 mo.	15,143	13,912	....
June	2,949	2,765	7,850
July	2,810	2,666	7,937
Aug.	3,059	2,860	8,201
Sept.	3,079	2,863	8,193
Oct.	3,442	3,187	7,893
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	....
1957			
Jan.	3,207	3,017	8,245
Feb.	2,661	2,473	8,276
Mar.	2,970	2,804	7,690
Apr.	2,896	2,723	7,542
May	2,832	2,706	7,188
5 mo.	14,566	13,723	....

PRODUCTION WORKERS

Estimated Number

	Apr. 1957	Mar. 1957	Apr. 1956
Ferrous	200,100	203,300	212,900
Nonferrous	65,500	68,000	64,700

Average Weekly Earnings

Gray Iron	82.78	82.99	85.07
Malleable Iron	82.01	83.50	83.23
Steel	96.98	97.86	95.22
Nonferrous	89.55	91.58	87.51

Average Weekly Hours

Gray Iron	38.5	38.6	41.7
Malleable Iron	38.5	39.2	40.8
Steel	41.8	42.0	42.7
Nonferrous	39.8	40.7	40.7

Source: Bureau of Labor Statistics.

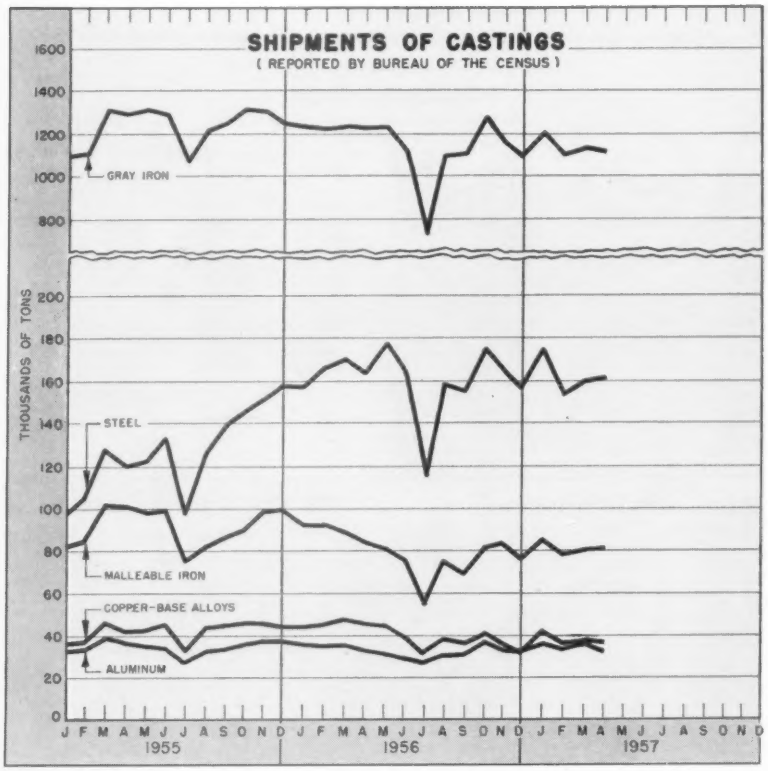
GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1955	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
Apr.	1,218,000	702,145	719,109	314,968	237,486	130,473	39,325	151,670	70,410	1,144,870
4 mo.	4,937,692	2,774,829	2,981,219	1,295,942	990,888	531,322	149,483	548,654	267,448	.....
May	1,235,631	737,081	702,834	321,413	243,719	131,294	38,419	171,859	78,800	1,086,122
June	1,152,156	686,896	656,778	298,578	217,135	102,405	34,028	170,122	74,093	1,041,315
July	762,611	487,736	509,702	241,771	9,556	7,003	32,484	144,964	65,905	1,109,069
Aug.	1,103,195	671,523	639,953	293,673	170,857	89,589	31,712	180,249	80,424	1,074,461
Sept.	1,109,943	648,784	623,743	282,824	233,823	117,708	35,361	151,081	65,935	1,037,283
Oct.	1,274,734	734,384	749,200	331,069	252,203	134,265	30,978	171,377	70,976	996,351
Nov.	1,175,572	634,856	720,263	303,938	251,262	131,321	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	254,703	136,584	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	2,624,146	1,381,490	406,191	1,746,902	817,762	.....
1957										
Jan.	1,213,215	642,317	761,697	320,058	261,961	136,456	31,139	101,069	57,346	904,860
Feb.	1,103,118	582,010	705,585	302,514	230,126	115,525	30,079	89,146	48,182	931,054
Mar.	1,133,146	604,481	713,767	305,104	214,775	98,694	36,995	108,158	59,451	934,847
Apr.	1,120,349	611,443	699,395	298,319	192,199	88,390	36,979	128,710	63,066	899,074
4 mo.	4,569,828	2,440,251	2,880,444	1,225,995	899,061	439,065	135,192	427,083	228,045	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1955	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
Apr.	163,708	125,015	27,475	121,723	91,332	25,302	41,985	33,683	2,173	600,242
4 mo.	657,769	507,795	118,253	487,677	370,589	110,729	170,092	137,206	7,524	.....
May	178,227	142,025	35,949	134,919	107,575	33,695	43,308	34,450	2,254	608,275
June	164,661	129,147	31,296	122,483	95,621	28,801	42,178	33,526	2,495	597,103
July	117,984	96,350	19,833	88,971	72,837	18,545	29,013	23,513	1,288	611,233
Aug.	159,831	127,001	32,965	119,025	94,257	30,601	40,806	32,744	2,364	586,496
Sept.	155,046	121,705	33,496	116,905	91,266	31,314	38,141	30,439	2,182	562,937
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Jan.	169,240	133,826	30,090	125,389	98,533	27,739	43,851	35,293	2,351	519,575
Feb.	154,932	121,667	27,181	114,805	89,480	25,060	40,127	32,187	2,121	511,806
Mar.	160,054	124,416	29,968	121,089	93,466	27,683	38,965	30,950	2,285	503,407
Apr.	162,498	124,549	29,708	122,894	93,512	27,624	39,604	32,037	2,084	497,632
4 mo.	646,724	504,458	116,947	484,177	374,991	108,106	162,547	130,467	8,841	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1955
1956
1957

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1955	75,150,247	76,266,385	3,154,052
1956			
May	6,725,396	6,587,030	241,558
5 mo.	33,646,323	32,710,312	1,293,245
June	6,235,691	6,163,668	214,484
July	2,301,442	1,596,570	193,431
Aug.	5,614,997	5,281,627	225,978
Sept.	6,453,229	6,609,309	211,015
Oct.	6,742,483	6,951,386	253,147
Nov.	6,328,272	6,681,074	237,330
Dec.	6,615,935	6,959,900	224,452
Total	73,938,372	72,953,846	2,853,082
1957			
Jan.	6,857,640	7,096,024	241,014
Feb.	6,211,845	6,302,583	228,569
Mar.	6,894,121	6,803,311	232,266
Apr.	6,436,273	6,396,900	226,698
May	6,637,378	6,526,494	220,675
5 mo.	33,037,257	33,125,312	1,149,222

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	20,769
Mar.	28,310	21,948
Apr.	25,808	23,507
May	23,437	22,037
June	18,842	18,888
July	17,364	.....
Aug.	23,812	.....
Sept.	20,929	.....
Oct.	23,045	.....
Nov.	21,818	.....
Dec.	18,046	.....
Total for year	274,096	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1955	778,000	493,244	.....
1956			
May	52,205	33,920	60,634
5 mo.	311,143	200,294	.....
June	47,775	31,983	61,809
July	42,227	27,301	64,806
Aug.	52,321	33,281	73,411
Sept.	46,340	33,967	79,390
Oct.	65,450	41,943	75,706
Nov.	64,972	39,718	74,623
Dec.	58,111	36,090	75,293
Total	688,339	444,577	.....
1957			
Jan.	67,964	42,189	75,503
Feb.	59,793	36,580	74,739
Mar.	61,378	40,593	64,466
Apr.	54,982	34,801	59,534
May	53,565	35,676	66,712
5 mo.	297,682	189,839	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1956	1957
Jan.	195.6	117.9
Feb.	169.0	188.4
Mar.	152.7	127.0
Apr.	135.2	101.1
May	207.0	136.2
June	156.7	....
July	110.3	....
Aug.	188.3	....
Sept.	114.7	....
Oct.	122.2	....
Nov.	121.0	....
Dec.	115.6	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1955	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Mar.	6,733,076	923,912	101,087	863,950
3 mo.	19,767,474	2,725,486	331,883	2,578,591
Apr.	6,490,680	862,233	96,514	842,216
May	6,491,567	855,007	104,485	899,967
June	5,994,989	776,299	87,525	831,456
July	1,986,613	621,064	56,071	399,441
Aug.	5,453,927	803,123	92,200	807,131
Sept.	6,231,017	738,824	84,627	841,783
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
Dec.	6,264,955	722,320	82,160	851,770
Total	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Jan.	6,630,804	874,764	102,782	927,499
Feb.	6,038,436	804,185	93,902	834,843
Mar.	6,294,038	814,372	92,534	903,149
3 mo.	18,963,278	2,493,321	289,218	2,665,491

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
May	6,873,102	232,375	329,750	5,625,067	685,910	6,064,632	413,494	24,074	28,596
5 mo.	34,342,956	1,079,422	1,703,750	28,249,356	3,310,428	30,605,590	2,126,634	118,937	89,276
June	6,387,608	213,769	331,871	5,277,488	614,480	5,642,004	379,803	22,039	23,460
July-Aug.	6,191,039	327,077	382,633	4,854,879	616,450	963,749	303,341	14,702	5,582
Sept.	6,873,352	236,809	316,590	5,636,288	683,665	4,618,718	404,948	22,719	17,604
Oct.	7,246,650	245,762	321,188	6,001,279	678,421	6,053,147	366,848	19,642	18,239
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	60,571,150	4,419,655	242,144	190,386
1957									
Jan.	7,209,547	135,608	344,073	6,081,137	648,699	6,482,472	423,660	22,989	20,431
Feb.	6,596,133	154,543	294,491	5,414,732	730,794	5,860,099	369,206	20,743	19,443
Mar.	7,179,100	168,650	347,451	6,008,135	654,864	6,155,334	370,915	20,241	23,259
Apr.	6,810,102	162,023	329,180	5,686,507	632,392	.....	.....	.....	.....
May	6,879,881	258,638	313,583	5,723,041	584,619	.....	.....	.....	.....
5 mo.	34,673,160	879,462	1,628,778	28,913,552	3,251,368	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.

6 ways

to assure good surfaces on shell-molded castings

Smooth castings that require a minimum of finishing are a major advantage of shell molding. Don't lose it through surface roughness that may cause otherwise sound castings to be rejected. Here are six ways to assure good surfaces on shell-molded castings:

1. Pour at the correct temperature. Usually, the lowest permissible pouring temperature results in the smoothest surface.

2. Check for poorly filled shells. Low density shells often cause roughness.

3. Avoid nozzle ingates. Increase ingate areas or choke the runner system.

4. Avoid metal inclusions. Keep runners full at all times, especially with drossing and high temperature alloys.

5. Position horizontally. This reduces metallostatic head, thus decreases tendency of metal to penetrate shell.

6. Check sintering point and grain size distribution of sand.

One thing more. Use a top-quality resin. G-E resins are preferred by many foundries for their good flow properties, fast cure, fine particle size and excellent release properties. Try them. And write today for a helpful brochure, "59 Answers to Your Shell Molding Problems".

GENERAL ELECTRIC COMPANY, Section F-5, Chemical Materials Department, Pittsfield, Mass.

Progress Is Our Most Important Product

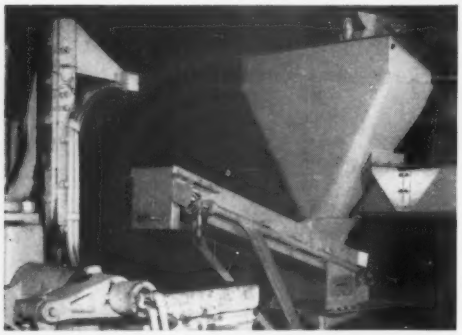
GENERAL ELECTRIC

Your Sand System
is as Good as Its Weakest Part

. . . That's why successful foundries invest in NEWAYGO ENGINEERED SAND SYSTEMS and COMPONENTS. Newaygo equipment is "foundry designed" to give continuous performance day after day, month after month, under toughest foundry production conditions.

All NEWAYGO ENGINEERED EQUIPMENT, whether it is a complete system or a component part stresses rugged construction — minimum handling and maximum production.

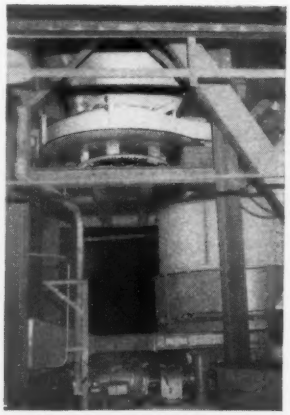
Molding Hoppers and Gates, a typical Newaygo engineered installation showing a bank of 19 overhead molders' hoppers serving cope and drag floors and squeezer molders. Emphasis is on maximum mold preparation with minimum fatigue.



Pivoting Flask Filler, a high speed, high capacity belt-type feeder Newaygo designed to receive sand from storage hoppers, plate feeders, belt conveyors or elevators. Spreads sand uniformly in large flasks on rollover machines or for floor molding.

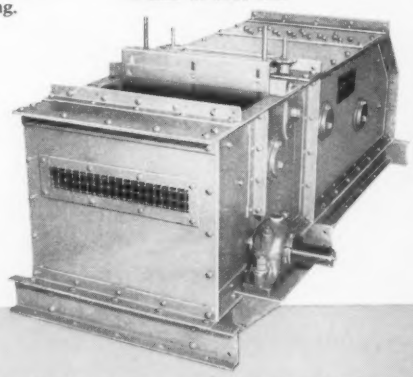
Rotary Plate Feeder

Positive volume feeder supplying a steady controlled flow of sand from 0 to over 100 tons per hour. Newaygo engineered to prevent spillage, sticking or bridging. Standard sizes 3, 6, 8 and 10-foot dia.



Aerator

A patented Newaygo design, this high speed aerator blends, tempers, cools and aerates sand more thoroughly than is possible by any other method.



Full information and specifications on all Newaygo Foundry Equipment are contained in Bulletin No. 56. Send for your free copy.

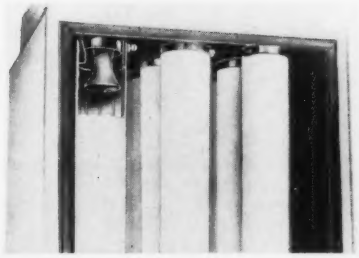
"Foundry Business is **BIG** *Business"*

NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . . and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 212



DUST COLLECTOR

Mikro-Pulsaire dust collector features continuous filter cleaning with complete absence of moving parts. Collector units consist of varied numbers of cylindrical filter elements, either 4 or 6 ft long, enclosed in a dust-tight housing. Dust-laden air is admitted to the housing through a side inlet. Clean air is withdrawn from the inside of the filter elements with an air circulating system. A major portion of the dust material goes directly from the inlet down to bottom discharge of the collector housing. The balance of the dust material is retained on the outside surfaces of the filter elements. A jet of high-pressure air periodically cleans the filters. This air is introduced through a specially contoured venturi mounted above each filter cylinder. Units are available with varying numbers and sizes of filter elements—9, 20, 30 and 48 tubes of either 4 or 6 ft length. Capacities range from 400 and 600 cfm in the 9-tube units to 3350 and 5000 cfm in the 48-tube units. Made by **Pulverizing Machinery Division, Metals Disintegrating Co.,** Chatham Rd., Summit, N. J.

For More Details Circle No. 401—Page 212

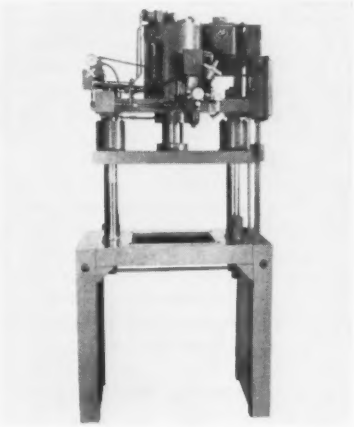
ETHYL SILICATE

Polymerized ethyl silicate has application in the investment casting industry, as a binder for high-temperature refractories, in treatment of graphite carbon molds, in a refractory wash for furnace linings and as a binder in powder metallurgy. Typical analysis of the silicate shows available SiO_2 at 41.85, no acidity to methyl orange, no suspended matter, APHA color of 5 and a specific gravity of 1.065 (20°/20° C). Made by **Inorganic Chemicals Division, Monsanto Chemical Co.,** 1700 South Second St., St. Louis 4, Mo.

For More Details Circle No. 402—Page 212

HYDRAULIC TRIM PRESS

Twenty-ton hydraulic trim press for die casting operations is operated by a 3 hp motor. The parallel strain rod principle, moving platen and heavy duty guide bearings give a large, well-supported working area that permits off-center loading and versatility of tooling. Available approach speed is 1200 fpm. Return speed is 450 in. per minute. Stroke is adjustable from zero to 12 in. with a specified shut height of from 12 to 24 in. between platens. Platens have an 18 x 24 in. free working area. Lower platen has a 15 x 18 in. cutout which can be eliminated or varied to suit needs. Typical operations on the press include staking, swaging, stamping, shearing, blanking, trimming and forming.

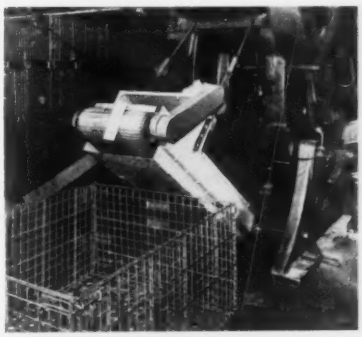


Distributed through **Arthur E. Bausenbach,** 75 Meadow Rd., Buffalo 16, N. Y.

For More Details Circle No. 403—Page 212

PORTABLE CONVEYOR

Series P Versa-Veyor for handling castings and small parts comes with a variety of standard belt widths or with special widths available on request. The conveyor can be moved by one man in and out of work areas to eliminate double handling



of work in process. Belt is four-ply, inner bound white, solid woven cotton with 1½-in. high steel cleats on 24-in. centers. A three-ply black neoprene belting on conveying side, friction surface on pulley side is optional or a balanced weave, woven galvanized steel wire belt with brazed selvage mesh count 42-41-14 is available. Drive unit is powered by gearhead motor with roller chain drive to head pulley. Normal belt speed is 60 fpm. Unit can be moved through a range from horizontal to 60 degrees and remains in balance at all angles. Made by **Belt Corp.,** 810 Stahl Rd., Orient, Ohio.

For More Details Circle No. 404—Page 212

X-RAY EQUIPMENT

Portable industrial x-ray equipment for inspection of castings, welds and assemblies contains built-in ten-

sion transformers, simplified, color-coded technique charts on the face of the control panels and protective devices for overloads, high voltage, excessive voltage and oil temperature. Three units in the MS Series are available with kvp ranges of 55-200, 70-260 and 70-300. The units weigh 176, 254 and 350 lb, respectively. Maximum penetration of steel on the larger model is 4¼ in. Supply voltages are 220/440, 50/60 cycles, single phase ac. Made by **Mitchell Radiation Products Corp.**, 128 East Washington St., Norristown, Pa.

For More Details Circle No. 405—Page 212

IMMERSION THERMOCOUPLE

Portable molten metal immersion thermocouple for measurements up to 3100° F uses a Metal-Ceramic LT-1 secondary protecting tube, a vitrified alumina primary tube and a platinum-platinum 10 per cent rhodium thermocouple. A curved stainless steel tube of any required length leads to a wooden grip and thermocouple assembly head. The standard model has 8 ft of armored connecting wire. Made by **Bristol Co.**, Waterbury 20, Conn.

For More Details Circle No. 406—Page 212

SILICON CARBIDE CRUCIBLE

Silicon carbide crucible features a large V-shaped pouring lip to assure smooth, even flow of metal without turbulence. The lip is said to be particularly adaptable to aluminum pouring in smaller type crucibles. Crucibles are shipped with pouring spout attached or are made available for lip cementing by the customer. Depending upon size factors, each lip is at least one-third and as much as one-half the over-all height of the crucible. The lip is self-supporting before it is cemented into place. Made by **Electro Refractories & Abrasives Corp.**, 344 Delaware Ave., Buffalo 2, N. Y.

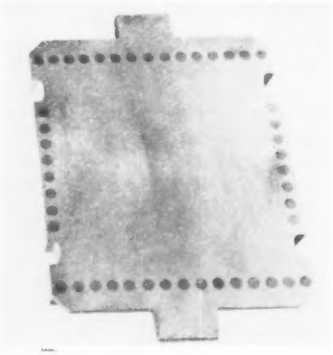
For More Details Circle No. 407—Page 212

LIGHTING FIXTURES

CFI-15, CFI-20, CFI-30 and CFI-30L industrial lighting fixtures are designed to use 8-ft Power-Groove incandescent lamps made by General Electric. The CFI-20 with 23 per cent uplighting is for high, medium or low-bay installation and is shielded with a plastic panel having prisms to control direct glare both crosswise and endwise. CFI-15, with 15 per cent uplighting, is used for medium and high-bay installations. CFI-30, with 28 per cent uplighting, has a center "V" louver to conceal the lamps and reduce brightness and is used where fixtures are viewed crosswise. CFI-30L, with 30 per cent uplighting, is for conditions where only louvered equipment can qualify. Low, medium and high-bay installations viewed in more than one direction make louvers necessary. Made by **Day-Brite Lighting Inc.**, 5411 Bulwer Ave., St. Louis, Mo.

For More Details Circle No. 408—Page 212

Cope and Drag Plates Are For Rugged Service



COPE AND DRAG plates reportedly provide a high degree of wear, accuracy and efficiency and have application in the heavy-duty requirements of jolt stripper or jolt rollover machines. Plates are made of aluminum alloy with or without steel inserts cast in along the flask line or machined to take steel wearing strips. High grade cast iron plates also are available. Both types are identical in design and are ribbed heavily to withstand stress.

In the cast aluminum plate, the steel inserts are cast in integrally along the flask line to reduce wear, increase the life of the plate and eliminate need for milling, drilling, countersinking and tapping operations required when steel strips are placed along the edges.

An illustrated wall chart (supplied upon request) tells at a glance the weights of the standard size aluminum alloy plates that are available and features a conversion table for determining the weight of cast iron plates of corresponding sizes. Made by **Kindt-Collins Co.**, 12651 Elmwood Ave., Cleveland 11, O.

For More Details Circle No. 481—Page 212

LITERATURE

Coreblowers

Design and performance data on Models 420 diaphragm and 420-D draw type coreblower and core shooter together with illustrations of equipment and accessories and helpful information about coreblowing and core shooting are offered in bulletin 42.—**Redford Iron & Equipment Co.**, 20733 Glendale, Detroit 23, Mich.

For More Details Circle No. 409—Page 212

Exothermic Products

Brochure B-101-57 describes the advantages of carbon-free liquidizers and exothermic compounds for all metals and alloys. Directions for use and rules of application also are provided.—**Pittsburgh Metals Purifying Co.**, 1352 Marvista St., Pittsburgh 12, Pa.

For More Details Circle No. 410—Page 212

Dust Separator

Air flow resistance and dust recovery curves, a temperature and pressure correction formula, selection chart, dimensions, supports and accessories for "HV" dust separator are covered in bulletin 576.—**Day Sales Co.**, 810 Third Ave., N.E., Minneapolis 13, Minn.

For More Details Circle No. 411—Page 212

Industrial Noise

Industrial noise, its effect and recommended cures, plus an approach to solving the hearing loss problem, are evaluated in booklet, "Why Must This Be?" — **Sigma Engineering Co.**, 1491 Vine St., Los Angeles 28, Calif.

For More Details Circle No. 412—Page 212

Hinged-Steel Belting

Bulletin MF-600 describes line of hinged-steel belting. Standard styles are shown and specifications and dimensions provided.—**May-Fran Engineering Inc.**, 1692 Clarkstone Rd., Cleveland 12, Ohio.

For More Details Circle No. 413—Page 212

Shell Core Machine

Performance characteristics and operating advantages of versatile shell core machine are illustrated and described in bulletin.—**Dependable Pattern Works**, 1634 S.E. Seventh Ave., Portland 14, Oreg.

For More Details Circle No. 414—Page 212

Industrial Equipment

Booklet, "Working for Profit," presents improved methods said to cut costs and advanced equipment that suggests ideas for new products and markets. On-the-job il-

For Foundrymen

lustrations show how company's equipment brings economy and efficiency to various industries.—**Whiting Corp.,** 157th St. and Lathrop Ave., Harvey, Ill.

For More Details Circle No. 415—Page 212

Data Sheets

Fourteen data sheets list room and elevated temperature properties of heat-resistant cast high alloys. Applications, design and fabricating characteristics and metallurgical structure of each alloy are described.—**Alloy Casting Institute,** 286 Old Country Rd., Mineola, N. Y.

For More Details Circle No. 416—Page 212

Truck Driver Training

Featured story in second issue of company's external house organ covers many points to remember for safe, efficient industrial truck operation and includes illustrations showing unsafe operating practices.—**Elwell-Parker Electric Co.,** 4205 St. Clair Ave., Cleveland 3, O.

For More Details Circle No. 417—Page 212

Shot and Grit

Catalog covers SAE specifications of Blastrite line of abrasive shot and grit. Methods and proper abrasive mixtures for shot peening and impact cleaning also are shown.—**Abrasive Shot & Grit Co.,** Springville (Erie County), N. Y.

For More Details Circle No. 418—Page 212

Metalworking Saws

Catalog MS-500 illustrates and describes coarse and fine pitch, high-speed, Semhi, carbide tipped and band saws and slitters for metalworking applications. Tool bits and steel specialties also are included.—**Huther Bros. Saw Mfg. Co.,** 1290 University Ave., Rochester 8, N. Y.

For More Details Circle No. 419—Page 212

Gas Thermostat

Heavy-duty, high-capacity gas thermostat for commercial and industrial equipment in temperature ranges to 550° F is described in bulletin RT-815.—**Robertshaw-Fulton Co.,** 110 East Otterman St., Greensburg, Pa.

For More Details Circle No. 42C—Page 212

Zirconia

Product list describes zirconium oxides, ram mixes and shapes, giving characteristics, physical properties and prices.—**Zirconium Corp. of America,** Solon, Ohio.

For More Details Circle No. 421—Page 212

PLASTIC SURFACE PLATES

Plastic surface plates for precision work are accurate within 0.002 T.I.R. of a true plane across the corners. Fine-grain granite in the rough is coated with a plastic to give a smooth hard surface. The plate reportedly won't warp, swedge, rust or corrode, is nonmagnetic and abrasion-resistant. No special care or oiling is required. Eight standard sizes from 24 x 60 to 72 x 96 in., with two, four or no ledges are made. Thickness range is 6, 8, 10 and 12 in. Made by **Renaud Plastics Inc.,** 5422 South Cedar Rd., Lansing 17, Mich.

For More Details Circle No. 422—Page 212

GEAR LUBRICANTS

Belex Polar type gear lubricants have been compounded with chlorine, sulphur, lead and mineral oils for exceptional heavy duty gear trunnion bearing and speed reducer type applications. Lubricants reportedly have good high temperature stability. Made by **Bel-Ray Co.,** Dept. 104, Green Village Rd., Madison, N. J.

For More Details Circle No. 423—Page 212

CRADLE MOUNTED FANS

Direct-connected cradle mounted fans are designed for product cooling, man cooling, drying, recirculation, elimination of air stratification and similar applications where the movement of air will improve the efficiency of the job being performed. Five sizes from 16 through 36 in. are available with air delivery ratings to 18,700 cfm. Either venturi entrance ring or tubeaxial construction can be supplied. Safety guards on both sides of the fan are standard. Propellers are aluminum-magnesium alloy powered by totally enclosed, sealed ball bearing motors. Made by **Robbins & Myers Inc.,** Springfield, Ohio.

For More Details Circle No. 424—Page 212

HUMIDITY CONTROL UNIT

Series of Model C Kathabar units are designed for accurate and selective control of humidity in processing, storage, drying and other applications. Corrosion problems are eliminated by use of nickel construction on the regenerator. Porthole type, glass inspection doors provide internal visibility and permit quick accessibility to sumps, eliminator chambers and fan chambers. Filter component is engineered for convenient removal to facilitate minor maintenance. Made by **Surface Combustion Corp.,** 2375 Dorr St., Toledo 1, O.

For More Details Circle No. 425—Page 212

ASH AND SULFUR ANALYSIS

High-temperature method for determining ash and sulfur in coal and coke uses a Leco high-temperature furnace operating in conjunction with a Leco automatic sulfur titrator. Coal ashing under the process requires 10 to 15 minutes. Coal is pyrolyzed in the furnace in a stream of nitrogen

Furnace Gives Controlled Atmosphere Melting

VACUUM MELTING research laboratory type furnace is for melting titanium, zirconium, vanadium, columbium, tantalum and other metals that require controlled atmosphere melting. It is designed to produce the standard 1½ in. diam x ½ in. deep evaluation button by arc melting of sponge or shavings or to produce sample ingots from 2 to 6 in. in diam, ranging in length up to 16 in., by the consumable electrode process. Molds are contained in a water-cooled copper crucible.

The furnace rectifier operates on a 100-amp continuous-duty cycle requiring 440-v, three-phase, 60-cycle power. Larger 6 in. ingots require 5000 amp. Rectifier lead is water cooled. Vacuum pump is capable of a 0.2 micron vacuum.

It is possible for the unit to be

pressure back filled with helium or argon or a combination of both. Made by **Oregon Metallurgical Corp.,** Box 311, Albany, Oreg.

For More Details Circle No. 482—Page 212

to remove the volatiles, followed by complete oxidation in a stream of oxygen. Analysis of sulfur takes about 6 minutes. A coal sample is burned at a temperature in excess of 3000° F in a stream of oxygen. Sulfur is released as SO_2 and is titrated automatically with the sulfur titrator. Made by **Laboratory Equipment Corp.**, St. Joseph, Mich.

For More Details Circle No. 426—Page 212

UTILITY FANS

All-purpose fans for industry have spot cooling, drying, processing and various portable or stationary applications. Model 39 has cast iron or rubber-tired wheels; model 56 has a column and large pedestal; stationary heavy-duty model S and Steeler, an exceptionally rugged portable model, are available in sizes 24 to 48 in. A portable utility fan is offered in 16 to 36 in. sizes. All the fans are available with two, four or six blade "macheta" air foil propellers. Directional air discharge of each is adjustable to 180 degrees. Construction is heavy gage steel with safety guards at front and rear. Made by **Aerovent Fan Co.**, Piqua 28, Ohio.

For More Details Circle No. 427—Page 212

LIFT TRUCK

FT-10 lift truck has 10,000 lb capacity for heavy-duty work characteristic of foundries, steel mills, warehouses or other places where heavy loads are handled. A two-speed, constant mesh transmission provides easy shifting. Power shift transmission, power steering and No-Spin differential are available as optional equipment. Roller type mast is made in three standard heights. Standard shaft type fork mounting permits use of various standard attachments plus those built to order for special material handling requirements. Made by **Allis-Chalmers Mfg. Co., Tractor Group**, Milwaukee 1, Wis.

For More Details Circle No. 428—Page 212

REPAIR KIT

Repair kit No. 6C for tools and castings is based on epoxy resins which will cure at room temperature. The paste is contained in two flexible tubes. One equal length bead from each tube insures correct proportions and as much or as little as needed can be used without damage to the balance of the tube contents. Made by **Houghton Laboratories Inc.**, Dept. JT, Olean, N. Y.

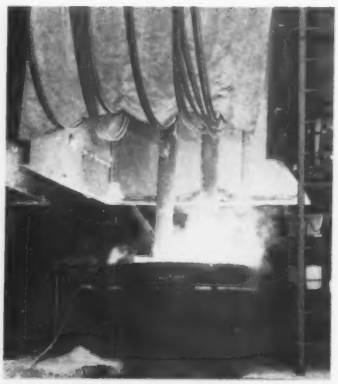
For More Details Circle No. 429—Page 212

MOUNTED WHEELS

V40 mounted wheels are available in all standard shapes and sizes and in a complete range of gradings to meet precision grinding requirements. Wheels can be supplied with hard, nickel-plated mandrels in a variety of sizes to fit various chucks. The abrasive is anchored with a special cement. Made by **Carborundum Co., Bonded Abrasives Division**, Niagara Falls, N. Y.

For More Details Circle No. 430—Page 212

Fiber Material Withstands Heat Above 2000° F



CERAMIC FIBER material that withstands temperature in excess of 2000° F is available in roving, yarn, cord, rope, woven tape, broadwoven fabrics and other textile forms. The application illustrated here is in use on an electric furnace to confine heat and flying globules of a molten mineral processed at temperatures ranging up to 3400 °F. The Fiberfrax fabrics cover a wide range of weights from 15 to 74 oz per sq yd and are made from staple fiber yarns in a variety of weaves and constructions.

Some constructions are inserted with stainless steel or nickel chrome alloy wire for increased tensile strength in the 1000 to 2000° F range. Roving and yarn are available in size ranges of 600 to 1000 yd per lb. Current and anticipated uses of Fiberfrax cloth and tape include insulating wrappings, gaskets, filter media, protective clothing, conveyor belts, various kinds of heat and flame barriers and membranes. Made by **Carborundum Co.**, Niagara Falls, N. Y.

For More Details Circle No. 483—Page 212

LITERATURE

Refractories

Reference sheet lists various types of firebrick, mortars, fire clays, plastic firebrick, castables, insulation and miscellaneous refractories, together with their applications.—**Gladding, McBean & Co., Refractories Division**, 2901 Los Feliz Blvd., Los Angeles 39, Calif.

For More Details Circle No. 431—Page 212

pH Electrodes

Bulletin 86-5 contains indexed, charted information to guide users in selecting correct pH electrodes. Bulletin is one of a five-bulletin package including information on Zeromatic, Pocket pH and other company pH meters. — **Scientific Instruments Division, Beckman Instruments Inc.**, 2500 Fullerton Rd., Fullerton, Calif.

For More Details Circle No. 432—Page 212

Hack Saw Blades

Specifications, selection data and operating suggestions for using hand and power hack saw blades are offered in catalog. Selection data relate blade types and tooth spacing to size and hardness of material to be cut. — **Heller Tool Co.**, Newcomerstown, O.

For More Details Circle No. 433—Page 212

Water Treatment

Bulletin WDC points out how proper water treatment of wet-type dust collectors will reduce hard deposits, congestion and corrosion, cut cleanout time and promote efficiency.—**North American Mogul Products Co.**, Standard Bldg., Cleveland 13, Ohio.

For More Details Circle No. 434—Page 212

Cut-Off Wheels

Bulletin GC-57 illustrates different types of wheel construction and covers applications of depressed center abrasive wheels for use with right-angle grinders.—**Electro Refractories & Abrasives Corp.**, 344 Delaware Ave., Buffalo 2, N. Y.

For More Details Circle No. 435—Page 212

Buckets and Hoppers

Illustrated bulletin describes a variety of side-dump and bottom-dump buckets and hoppers for handling bulk materials. — **Penn Iron Works Inc.**, Reading, Pa.

For More Details Circle No. 436—Page 212

Transmission Equipment

Catalog 914 provides descriptive information with drawings and tables of dimensions covering a vari-

USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES AND LITERATURE DESCRIBED IN THIS SECTION

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For Foundrymen

ety of shaft collars, couplings, clutches, pillow blocks, take-ups, wheel hubs, gears, holdbacks, chains and sprocket wheels used in elevating and conveying machinery.—**Jeffrey Mfg. Co.,** Columbus 16, Ohio.

For More Details Circle No. 437—Page 212

Compressed Air Filter

Catalog 357 discusses the contamination present in all compressed air, the damage it causes and a means of combating such trouble through use of a mechanical cleaner that employs centrifugal force, baffles and vanes to provide thorough cleaning of compressed air lines.—**Logan Engineering Co.,** 4901 West Lawrence Ave., Chicago 30, Ill.

For More Details Circle No. 438—Page 212

Bridge Cranes

Construction details, weights, dimensions and general information on B-47 hand traveling crane available in capacities of 3 to 10 tons with spans up to 50 ft are found in bulletin DH-459A.—**Wright Hoist Division, American Chain & Cable Co.,** York, Pa.

For More Details Circle No. 439—Page 212

Barrel Finishing

Booklet on Honite method of barrel finishing contains case histories illustrating cost reduction, time saving and improved finish that result from using Honite materials and methods.—**Minnesota Mining & Mfg. Co.,** Dept. F7-113, 900 Bush St., St. Paul 6, Minn.

For More Details Circle No. 440—Page 212

Welding Guide

Booklet, "Guide to Better Welding," provides an on-the-job reference source for all types of welding with Marquette electrodes and gas rods. It tells what rod to use for any job, how to use each rod, what amperages to use, plus the hardness and chemical content of each rod and electrode.—**Marquette Mfg. Co.,** 307 East Hennepin Ave., Minneapolis 14, Minn.

For More Details Circle No. 441—Page 212

Fork Truck

Specifications, operating characteristics and design features of Clarklift Y-200 pneumatic tire fork truck of 20,000 lb capacity are found in brochure. Dimensional characteristics, turning radius, drawbar capacity and upright dimensions also are included.—**Clark Equipment Co., Industrial Truck Division,** Battle Creek, Mich.

For More Details Circle No. 442—Page 212

NONFLAMMABLE GREASE

No-Flame, a nonflammable grease, is a nonmelting, waterproof grease claimed to have good extreme pressure characteristics. It can lubricate under very high temperatures as well as when used on highly loaded bearings. The grease has no melting point and incorporates a nonflammable synthetic fluid in its composition. Made by **Bel-Ray Co.,** Dept. 105, Madison, N. Y.

For More Details Circle No. 443—Page 212

CHIPPING CHISELS

Pneumatic scaling and chipping chisels of alloy steel have an ultimate strength of 350,000 psi. Wide range of standard and special sizes can be supplied. Chisels are designed to provide the operator with increased power from his air hammer by reducing air loss. Made by **Tampco Inc.,** Box 10344, Pittsburgh 34, Pa.

For More Details Circle No. 444—Page 212

PARALLEL SHAFT REDUCER

Parallel shaft reducers in ½ to 20 hp and in 12 ratios are available without motors. The design permits the input shaft to be driven by either a coupling, chain or V-belt drive. Units are rugged, machined from high tensile steel with gear teeth precision generated. Quiet operating, they are designed to carry normal overhung loads on the output shaft. Made by **Rockwood Pulley Mfg. Co.,** 20 Crosby St., New York 13, N. Y.

For More Details Circle No. 445—Page 212

AIR OR OIL CYLINDERS

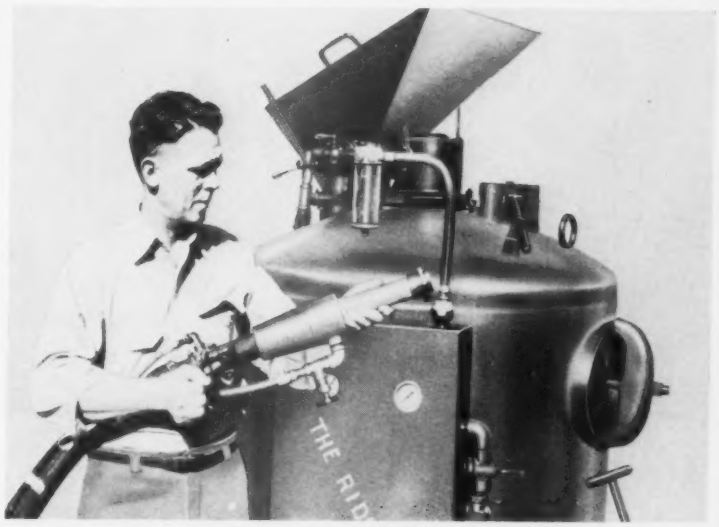
Logansquare cylinders for air or oil service are built in 14 different mounting styles in sizes ranging from 1½ to 8-in. bores. Cushioning is available for either or both ends. Cushioned or noncushioned cylinders have same mounting dimensions. Cylinders are equipped with hardened and chrome-plated piston rods. Operating pressures are 150 psi air service or 300 psi oil service. Mountings are interchangeable with other leading manufacturers of this type of cylinder. Made by **Logansport Machine Co.,** Logansport, Ind.

For More Details Circle No. 446—Page 212

SKID TRANSPORTERS

Skid transporter models WWHY-4 and 6 and WWLY-4 and 6 platform walkie industrial lift trucks are designed to move loads of 4000 and 6000 lb carried on skids of varied heights. In the WWLY-4 and WWHY-

Refractory Gun Permits One-Man Operation



REFRACTORY AND CEMENT GUN is engineered to permit one-man operation of material, air and water flow. Four sizes are available to fit the needs of all cupola and electric furnace operations—1700, 3000, 4300 and 5600 lb. Other units can be built to specification with either smaller or larger capacity. Granular cement-like materials from 30 to 160 lb bulk density can be handled by the gun. Made by **Ridley & Co.,** 11275 Massachusetts Ave., Los Angeles 25, Calif.

For More Details Circle No. 484—Page 212

TWO VALUABLE AIDS TO FOUNDRY EFFICIENCY

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Republic Metallurgical Service, Plus All Grades of Merchant Pig Irons

It's a rare instance when a foundry does not profit by a visit from the man who knows his irons—the Republic Pig Iron Metallurgist.

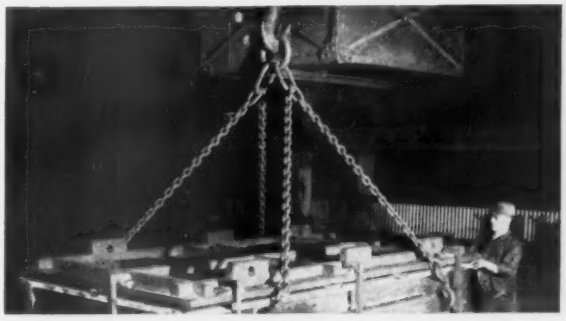
He is frequently called upon to make a routine survey to determine whether a foundry is operating at peak efficiency. His recommendations and suggestions often result in improved operations, increased production efficiency, and output at lower unit casting-cost. There have been numerous cases where a seemingly minor change in operation or procedure has resulted in recapturing business lost to other methods of fabrication.

The Republic Pig Iron Metallurgist is both foundryman and skilled technician. He has a solid background gained from years of actual foundry experience. He talks a language you can understand. He knows all types of irons and their characteristics. Information on the latest techniques, processes, and controls available for improving castings, and expanding their use and sale, is at his fingertips.

This welcome visitor to foundries of all sizes is backed by Republic Steel, the only producer of all grades of merchant pig iron. This fact enables him to recommend the proper grade of pig iron for your specific job without hesitation or prejudice.

Why not call in the Republic Pig Iron Metallurgist the next time you need practical or technical foundry advice? There's no cost or obligation for his services. The coupon will let us know when you would like him to call.

ECONOMY at every stage of production, from handling to shipping, is being enjoyed by users of Republic Materials Handling Equipment. One company, using the PB-120T Box and Skid Units shown above, cut handling costs 25%, reduced inventory time, freed valuable floor space for production equipment. Republic Materials Handling Engineers will help you design equipment to meet your specific needs. Mail the coupon for more facts.



EFFICIENT HANDLING of heavy castings is provided by Republic Chain Slings. Each sling is designed, tested, and warranted for the highest degree of safety. Republic Chain Slings are made to your requirements in alloy steel, high test steel or wrought iron. Fittings and accessories are given the same precision processing as the chain itself. Our new catalog, Adv-719, contains complete information on types, care, storage, ordering, etc. Write for your copy.

VALUABLE DIES, patterns, tools and other heavy items can be stored safely on Republic Wedge-Lock Steel Shelving. It is specifically designed for high stacking of enormous weights. Joints get tighter and stronger as weight is increased. There's no sagging, swaying or buckling. Wedge-Lock is the answer to maximum loading in minimum floor space. It assembles quickly and easily and is completely flexible to meet changing requirements. Write for more information.

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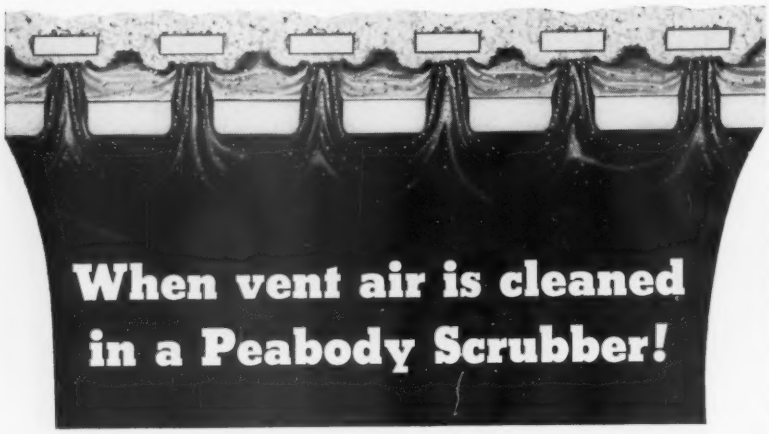
Clean Air from Foundry Vents



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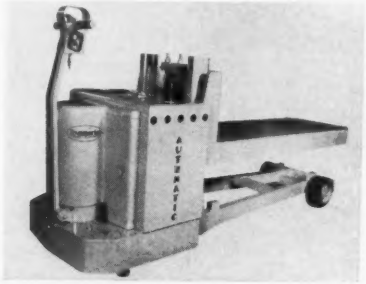
4 the capacity range is 4000 lb up to 54 in. of platform length while the capacity of the WWLY-6 and WWHY-6 is 6000 lb up to 48 in. of platform length. The WWHY-4 and WWLY-4 are equipped with single steel or rubber wheels while the

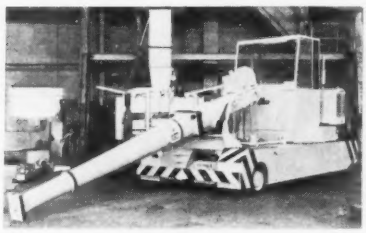


WWLY-6 has only single steel wheels. The WWHY-6 is made with single steel or dual rubber tires. A butterfly type switch plate on the steering handle provides three speeds forward and three reverse. Steering effort is minimized by a large-diameter ball race which supports the drive units. Made by **Automatic Transportation Co., Division of Yale & Towne Mfg. Co.**, 149 West 87th St., Chicago 20, Ill.

For More Details Circle No. 447—Page 212

FURNACE CHARGER

All-hydraulic Auto-Floor furnace charging machines are available in eight sizes ranging in capacity from 2000 to 20,000 lb and use diesel, gasoline or propane engines or plant electricity as a power source. They



are furnished with boxes for charging scrap, limestone or other loose materials or various tongs to handle ingots, billets, slabs or other solid forms. (Box is not shown in the illustration.) The machines are designed for use in plants requiring continuous furnace charging service. Made by **Salem-Brosius Inc.**, Box 2222, Pittsburgh 30, Pa.

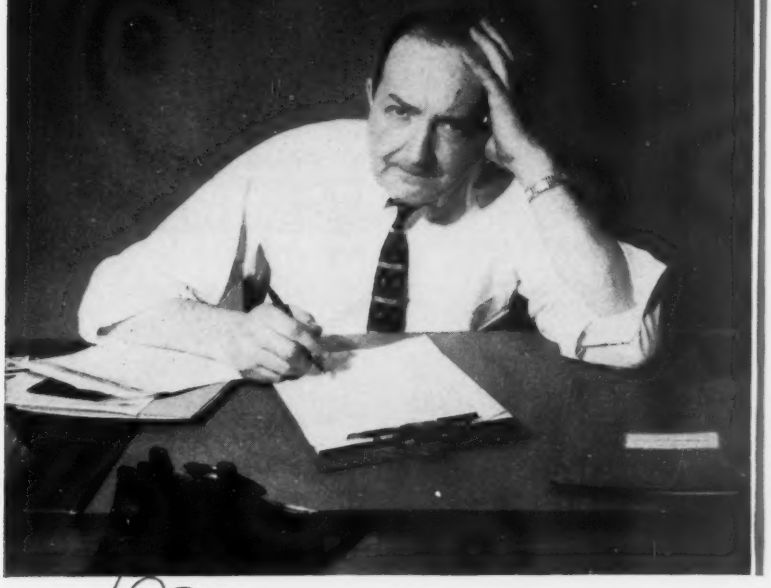
For More Details Circle No. 448—Page 212

ROLLER CHAINS

Standard line of SS type chains for conveyor, elevator and power transmission uses has been expanded by five sizes of bushed chains and

For Real Help

in making cold setting binder work



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Many foundries are reaping cost savings of as much as 65% with the Kold-Set cold setting binder process. Two facts account for this...

Kold-Set is a *proved* cold setting binder. Moreover, in introducing this totally new concept of core and mold making, G. E. Smith foundry specialists learned very early that the cold setting binder process cannot simply be used. It must be engineered . . . adapted to each foundry's individual method of operation. This requires specialized training and experience.

G. E. Smith engineers have the training and experience necessary to come into your plant and make the Kold-Set process work . . . to adapt it to your operation for best results . . . consistently.

So, if you want real help, call G. E. Smith now! Once installed, the Kold-Set process means cost savings in your overall operation.

FOR FULL TECHNICAL DATA...

Write for Technical Bulletins 2 and 3 for the complete story on the Kold-Set process and how it can drastically reduce costs.

KOLD-SET

COLD SETTING BINDER ADVANTAGES

Laboratory Control

Only finest ingredients, in full measure are used to make Kold-Set Binder and Activator. Completely uniform manufacture, governed by scientifically controlled laboratory procedure makes Kold-Set consistent in quality . . . the unrivaled best cold-setting binder.

Engineering "Know-how"

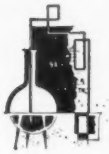
G. E. Smith engineers have the broad background of foundry experience necessary to apply Kold-Set to core and mold making problems intelligently. They are backed up with a thoroughly qualified, service-minded engineering and research organization.

On the job Assistance

G. E. Smith service includes "in-plant" assistance in setting up the best method for making cores and molds with the equipment available. Engineers are qualified and equipped to recommend methods to achieve optimum results with Kold-Set at a minimum of expense.

Proved Performance

The Kold-Set process not only greatly speeds core and mold making. It has been proved in plant after plant to produce uniform, more accurate cores and molds with excellent surface and dimensional stability. It produces better castings at lower overall cost.

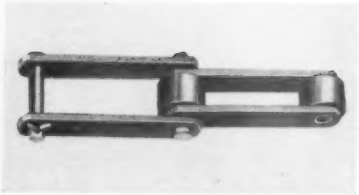


G. E. SMITH, INC.

246 WASHINGTON ROAD PITTSBURGH 16, PA.

ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES.

Circle 690 on Inquiry Card—Page 51

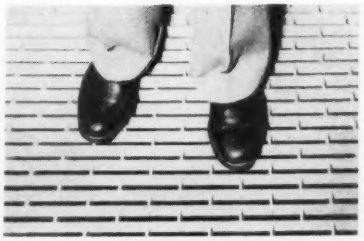


15 sizes of bushed roller chains. The all-steel chains feature locked-in, nonrotating pins and bushings for maximum service life under severe conditions. Sizes range from 2.60 to 9.00 in. pitch with ultimate strengths from 13,000 to 100,000 lb. All chains can be furnished in straight or side-bar construction and with standard or special attachments. Made by **Majestic Stamping Co.**, 9310 Hubbell Ave., Detroit 28, Mich.

For More Details Circle No. 449—Page 212

ALUMINUM GRATING

Rectangular riveted aluminum grating provides a 79 per cent clear opening to minimize possibility of dirt, oil or scum accumulation. Grating



reportedly remains structurally rigid regardless of cutouts located in any part of the panel. It meets the Navy military specifications as to design and strength and is engineered to retain the combined advantages of a rectangular opening and riveted gratings. Made by **Klemp Metal Grating Corp.**, 6601 South Melvina, Chicago 38, Ill.

For More Details Circle No. 450—Page 212

LIFE SAVING DEVICE

Lightweight resuscitator weighs about 20 lb with its two "D" oxygen cylinders and is designed so it can be fastened quickly to one's back. It is held in place with elastic bands. A control adjusts the flow of oxygen to the lung capacity of any patient, automatically inhaling and exhaling for him until his own breathing is restored. A turn of a dial converts

the unit to an inhalator to provide 100 per cent oxygen. It can be used also as an aspirator to suck obstructing material from the throat. Made by **National Cylinder Gas Co.**, 840 North Michigan Ave., Chicago 11, Ill.

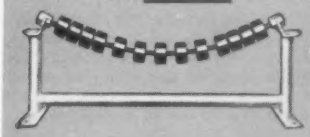
For More Details Circle No. 451—Page 212

SELF-PROPELLED CRANE

Self-propelled crane requires but one man for operation as all controls for carrier as well as turntable operations are located at the operator's position in the cab. The 25-ton unit features air controls for the carrier for maximum maneuverability and

FORD Foundry uses JOY LIMBEROLLER Belt Conveyor Idlers

Joy Limberollers at work on a belt conveyor at Ford's Cleveland Foundry.



This radical, new idler is used in handling abrasive foundry sands at Ford's Cleveland Foundry. Each idler is a single roller consisting of a series of pressure-molded neoprene or rubber discs on a flexible steel cable. Only two bearings are used and these are up out of the dirt zone.

Joy's new belt conveyor idler has already given over *twelve times* the service life of conventional idlers in handling many difficult materials . . . abrasive foundry sands, coal, petroleum coke, potash, copper ores, mill tailings, iron ore, wet concrete, triple super-phosphate, ammonium sulphate and sticky fertilizers.

The Limberoller is unaffected by most corrosives that damage steel . . . is ideal for chemical, sulphur and salt plants.

Get details from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 137-13

Consult a Joy Engineer

For Air and Gas Compressors, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors

WSW L-6359-137

JOY

Since 1851 . . . Over 100 Years of Engineering Leadership

Finished cores made with DEXOCOR combine high tensile strength and scratch hardness with high resistance to cracking and distortion, yet shake out easily.

Big producers of steel castings are "performing miracles" with the revolutionary new binder—DEXOCOR.

They report that DEXOCOR substantially reduces mulling time, saves on bake time as much as 40%, assures clean interior surfaces that need far less machining.

DEXOCOR used with cereal binders aids moisture control, provides excellent flowability, quick, easy mixing, blowing, ramming—and a welcome reduction in core scrap. With high green strength, baked strength, and scratch hardness this remarkable new binder combines ready collapsibility, helps produce superior castings to closer dimensional tolerances despite intricate coring.

Says one of the country's top producers of steel castings, "The benefits were so obvious we changed over completely to DEXOCOR, now use it exclusively in sand mixes."

An 8-page report on the use of DEXOCOR Binder in steel casting is yours for the asking. Ask also about friendly help from our foundry specialists in the use of DEXOCOR for improved cores.

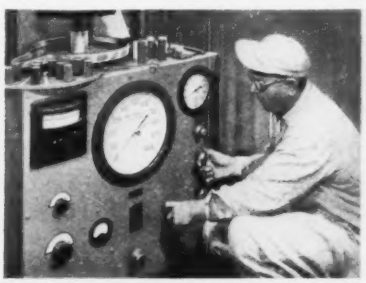
CORN PRODUCTS SALES COMPANY
17 Battery Place, New York 4, N. Y.

DEXOCOR®
BINDER

the perfect teammate for MOGUL® *and*
KORDEK® BINDERS • GLOBE® DEXTRINES

A water-soluble powder, DEXOCOR is convenient to handle, assures excellent flowability of sand mixes, contributes to uniform density of cores.

Increased thermal resistivity of cores made with DEXOCOR effectively curbs distortion and cracking, and also improves their collapsibility.



Uniform density throughout blown cores is assured by use of DEXOCOR. Sand mix fills recesses and corners as completely as other areas of box.

Circle 692 on Inquiry Card—Page 51

September 9 to 14.... *See*

REVECON AND REVERBALE

RAPID-MELTING FURNACES

IN ACTION AT READING, PA.

REVECON

Non-crucible. Melts Monel, brass, bronze, aluminum, gray iron and high alloys on *two-thirds less fuel* than crucible type—and melts it *three times faster.* Interchangeable burners for oil or gas. Also coke fired. Low refractory cost.

REVERBALE

Dip-out furnaces for yellow metal and aluminum permanent mold casting engineered to *cut melting costs 66% . . . melt metal three times faster.* No crucibles required. Lower metal losses and gas pick-up. Low capital outlay.

SEE HOW AND WHY YOU GET THESE BIG SAVINGS IN TIME AND MONEY!

During our SEPTEMBER OPEN HOUSE—Sept. 9 to 14—we will run a special heat of a metal of your choosing. Furnaces are demonstrated by our own foundry technicians and accurate time and fuel measurements will prove our claim: These Are The Most Economical Melting Units Ever Offered the Industry. Phone or Write R. B. Harrison for your "demonstration date" . . . and ask for our informative book "EFFICIENCY IN MELTING".

COMPLETE SERVICE AFTER SALES

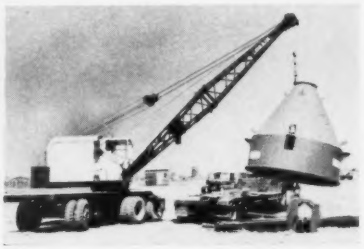
INTERNATIONAL FOUNDRY SUPPLY CO.

P. O. Box 1053, Reading, Pa. Phone: FRanklin 6-0794

SEE REVECON and REVERBALE in ACTION at our READING, PA., DEMONSTRATION PLANT

Canadian Representative: Drew Brown Ltd., 5410 Ferrier St., Montreal 9

reduced operator effort. A 30 ft, pin-connected crane boom of alloy steel of square-tubular-chord design provides increased lifting capacities and longer ranges at reduced weight. "Joy-Stick" controls for air-power



operation of all turntable clutch operations is provided. Crane has four travel speeds in both directions. Rear counterweight is easily and quickly detached for over-the-highway travel. Made by **Thew Shovel Co.**, Lorain, O.

For More Details Circle No. 452—Page 212

SAFETY LOCKS

Adjustable safety units clamp onto curbs of company's dockboards to lock it into a slipproof position between the dock and carrier. The "Span-Locks" can be positioned and repositioned to meet varying dock-to-carrier span requirements without need for tools. Simple push-pull lever action locks the jaws of the

unit to the dockboard safety curb. The bottom of the lock extends down into the span between dock and carrier, fits flush against edge of the dock. In practice, Span-Locks are used in pairs—one on each safety curb. Made by **Magnesium Co. of America**, East Chicago 19, Ind.

For More Details Circle No. 453—Page 212

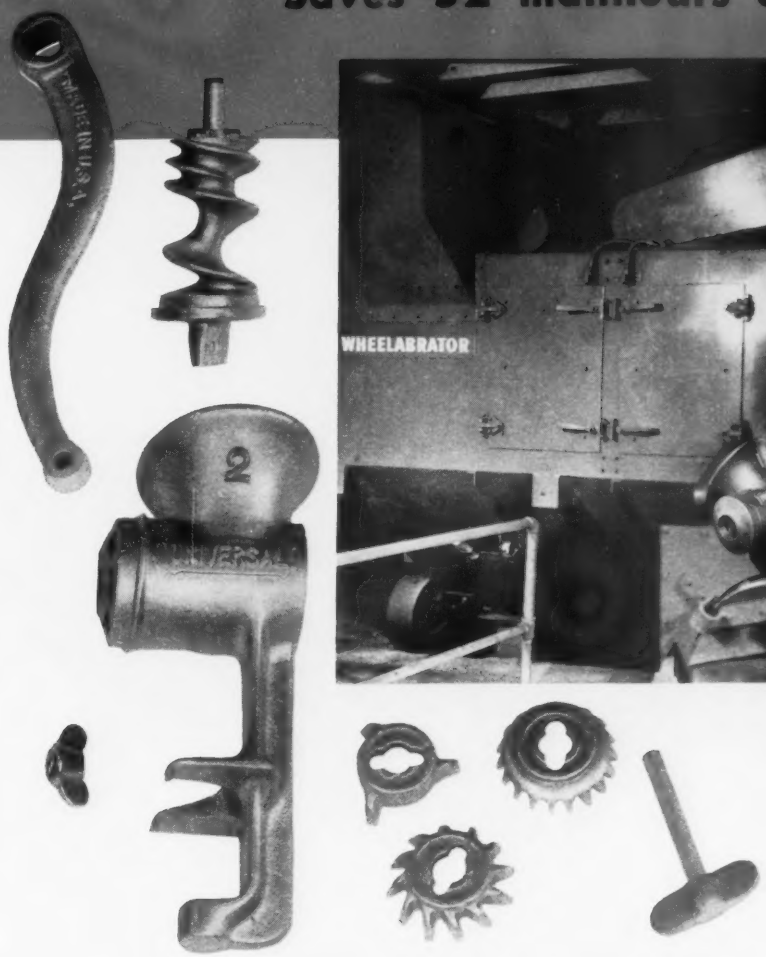
TRIMMING PRESSES

Trimming presses for removing flash from die castings feature wide bed area with low tonnage and convenient bed openings for disposal of

WHEELABRATOR® Continuous Tumblast

Replaces 2 batch-type machines

Saves 32 manhours daily



An immediate reduction of 32 manhours daily was effected at Landers, Frary & Clark, New Britain, Connecticut, with the installation of a Wheelabrator Continuous Tumblast for cleaning gray iron components for UNIVERSAL food choppers. Two batch-type mills were replaced with this machine that requires no operators. Other advantages obtained as reported by Mr. Arthur Cherwin, Foundry Supt. are: "A three-fold production increase, shot reduction of 40%, and a high degree of surface cleanliness."

There's a Wheelabrator machine for every foundry cleaning problem.
Write today for information. Ask for a copy of Catalog 143-D.

WHEELABRATOR CORPORATION

505 SOUTH BYRKIT STREET, MISHAWAKA, INDIANA

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Circle 694 on Inquiry Card—Page 51

scrap. Hydraulically or mechanically operated models are available. Bed and slide areas are standardized at 18 x 32 and 24 x 36 in. and 12 x 18 and 20 x 34 in., respectively; lengths of stroke from 3 to 12 in.; strokes

per minute from 30 to 120 and tonnages from 25 to 60. Standard slide adjustments and slide knockouts are available. Made by **Clearing Machine Corp., Division of U. S. Industries Inc.**, 6499 West 65th St., Chicago 38, Ill.

For More Details Circle No. 454—Page 212

HAND LIFT TRUCK

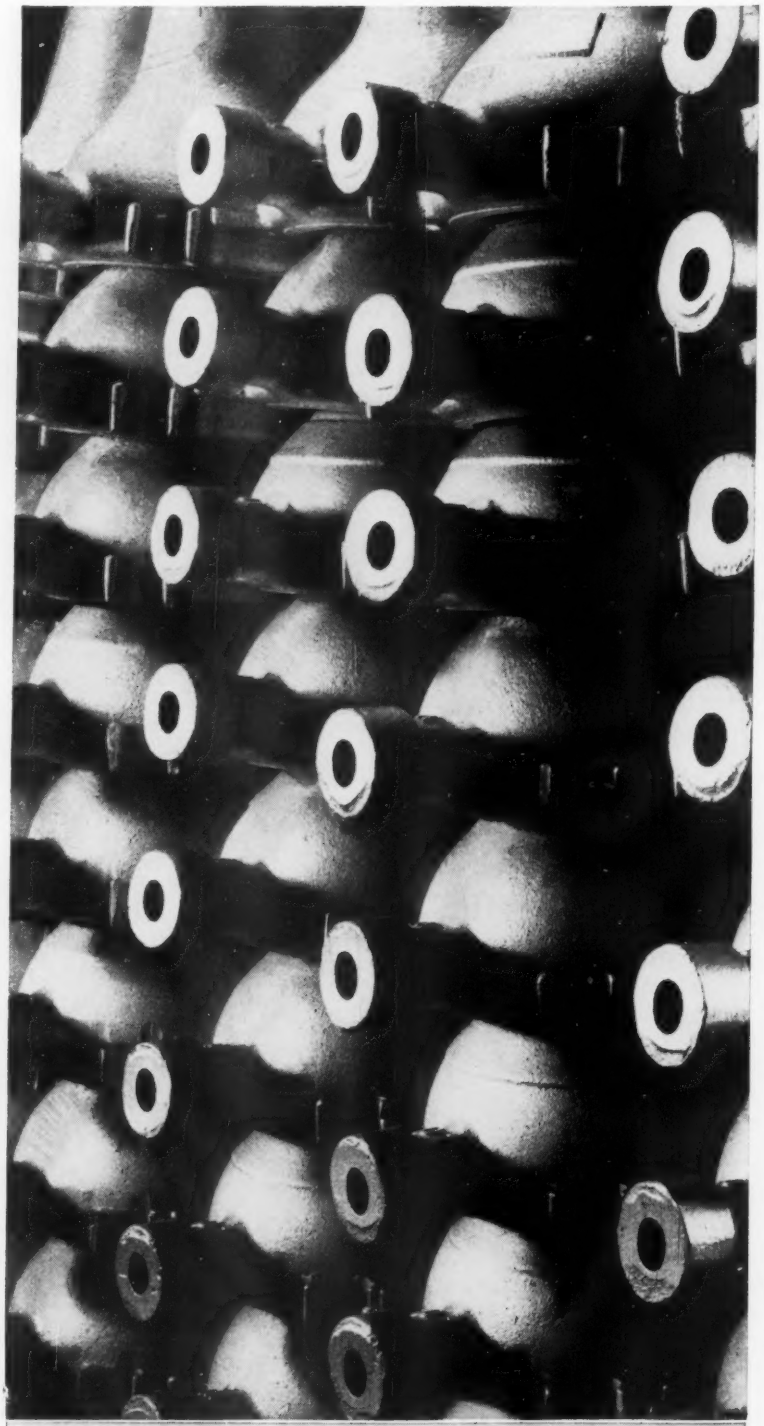
Hand truck is equipped with compact hydraulic lift system. Six strokes of the handle will raise a capacity load of 2500 lb to full lifting height of 3 in. Another model of 4000 lb capacity requires 10 strokes to lift the capacity load.

Both trucks are available in narrow and wide types in a variety of platform lengths. Made by **Barrett-Cravens Co.**, 628 Dundee Rd., Northbrook, Ill.

For More Details Circle No. 455—Page 212

AIR CONTROL VALVES

Nopakmatic poppet type air control valves are available for pressures to 150 psig for two, three and four-way operation with master (air), single or double solenoid pilot control. Pipe sizes are from ¼ through ¾-in. Both single and double solenoid pilot heads provide automatic selection of pilot air pressure from whichever port is used as inlet and eliminate



Federated products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

need of special valves for each application or reassembling parts to obtain desired operation. Any three-way valve can be piped normally open or normally closed to pressure by piping to proper port. All three-way valves have two cylinder outlet ports and four-way valves are available as standard with side or bottom porting. Made by **Galland-Henning-Nopak Division,** 2784 South 31st St., Milwaukee 46, Wis.

For More Details Circle No. 456—Page 212

EXTINGUISHING SYSTEMS

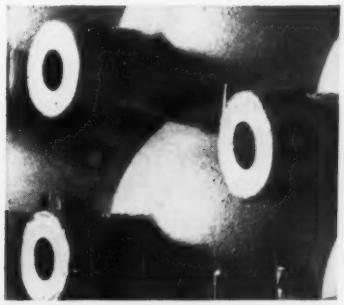
Packaged carbon dioxide fire extinguishing systems for industrial spaces containing normal flammable liquids are available with 10 to 300 lb of CO_2. Also available are local and remote manually-operated actuating controls with the larger auto-

matic systems. The packages contain all the components needed to install an automatic system which will protect rooms of from 140 to 6000 cu ft. Accessory items such as remote control pull boxes, pressure alarms and other pressure-operated trips and switches used to close doors and windows or turn off electrical equipment or machinery are available. Made by **Walter Kidde & Co.,** Belleville, N. J.

For More Details Circle No. 457—Page 212

SEALED CYLINDER

Four design changes in an all-Teflon sealed cylinder permit increased pressure ratings for cylinders in medium to high pressure applications. New tube end seal (2) and rod bushing seal (1) of Teflon plastic replace "O" ring seals. Cushion adjusting screw (4) is flush with head or cap and has a self-regulating lock seal which holds its seal no matter where the adjusting screw is set. Ball check (3) is located opposite the adjusting screw. The Teflon plastic is inert to virtually all fluids and is resistant to tempera-



Do you get the same performance from every lot of BRONZE you buy?

If you buy bronze from Federated, you can be sure that you'll get exactly what you've ordered . . . that you will get the same performance out of each lot.

Every single heat of bronze or brass made by Federated undergoes rigorous spectrographic or chemical testing. Alloys that do not exactly meet specifications are never sold.

Moreover, you'll get exactly the same SAE, ASTM or Military Specification bronze every time, whether you buy daily, weekly, or just once in a while. Your customers know exactly what to expect from their castings. Your ability to produce castings of identical quality year after year will bring you business.

Quality control at Federated is under the supervision of trained metallurgists, and you pay nothing extra for the advantages this quality control brings you.

A Federated field man will be in to see you soon. Talk to him about metal quality. It will benefit you.

Federated Metals

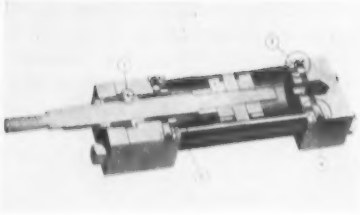
ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal



tures up to 500° F. Made by **Miller Fluid Power Division, Flick-Reedy Corp.**, 2040 North Hawthorne Ave., Melrose Park, Ill.

For More Details Circle No. 458—Page 212

JIB CRANE

Base mounted jib crane features a heavy duty beam support bearing which provides safe load support while requiring a minimum of maintenance. The large tapered roller bearing is located at the top of the support column. Below are a pair of steel rollers which bear on a wear band welded to the column. Rollers are mounted on antifriction bearings and are fully adjustable. Construction is such that the total beam deflection under full load does not exceed 0.060 in. per ft. The crane is

built in 52 sizes in capacities from 500 to 10,000 lb with boom lengths from 8 to 20 ft. Full 360 degree rotation is provided. Made by **Becker Crane & Conveyor Co.**, 4900 Ridge Rd., Cleveland 9, O.

For More Details Circle No. 459—Page 212

Cut foundry operating costs . . .

Transite Core Plates are strong and durable . . . resist warpage, impact and abuse, provide long service life.

with Transite Core Plates and Slip Jackets

"Johns-Manville Transite* Core Plates help assure maximum production in minimum time"—that's the experience of foundrymen who have used them for years. Made of asbestos and cement, they are light in weight, yet strong and durable. Being non-metallic, they resist corrosion, maintain their smooth surface and can be easily cleaned.

Transite Slip Jackets are a companion product with similar advantages. They do not burn, retain their original shape despite runouts. Slip jackets are furnished in both white and black types. The latter is widely used as a protective liner for metallic slip jackets.

FREE . . .
New Folder
gives complete details on Transite Core Plates and Slip Jackets—as well as Transite Pallite products for dielectric furnaces. For your copy of folder PP-31A, write Johns-Manville, Box 14, New York 16; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

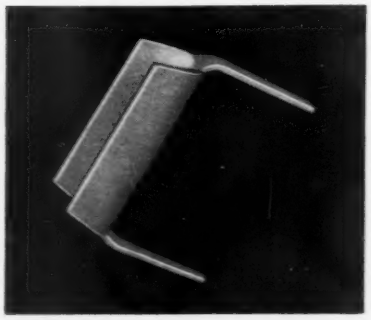
Transite Slip Jackets cost less than other types . . . last longer, too. Result—important savings for foundries.

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES AND SLIP JACKETS

INTERNAL CHILLS

Fuspider steel chill nails feature one-piece construction and a scientific arrangement of mass plus surface to provide rapid heat transfer and maximum burn-in and fusion



with metal. Nails are made in a wide variety of sizes and styles to accommodate various mold requirements. Made by **Canton Chaplet and Chill Division, W. L. Jenkins Co.**, 1445 Whipple Rd. S.W., Canton, Ohio.

For More Details Circle No. 460—Page 212

CARBIDE SCRIBER

Slim-Line Micro-Scriber features a 95 per cent tungsten carbide and 5 per cent cobalt tip, diamond ground and precision lapped. Tip is secured in an anodized aluminum hexagonal body to eliminate rolling. The Slim-Line is used for close and fine scribing on all metals, including case-hardened steel. Made by **Greist Mfg. Co.**, New Haven, Conn.

For More Details Circle No. 461—Page 212

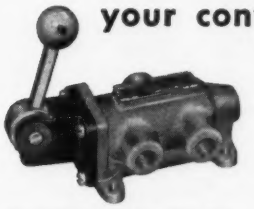
WIRE ROPE BLOCK

Heavy-duty rigger-slusher block is made of alloy steel and will withstand 14-ton dead loads without

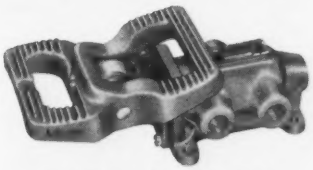
Schrader®...

your one source for AIR VALVES

full line for every use—immediately available from your conveniently located Schrader Distributor

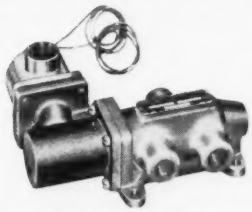


Hand-Operated Four-Way Valve



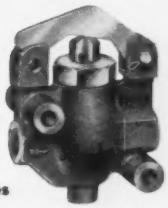
Foot-Operated Four-Way Valve

Pilot-Operated Valve



Solenoid-Operated Valve

Rotor Type Valve



Cam-Operated Valves

Flow Control Valves

Quick Exhaust Valves

Two- and Three-Way Poppet Type Valves with Roller Lever

CYLINDERS and everything you need in AIR ACCESSORIES
AIR CYLINDERS
push, pull, single or double-acting
Pivot Bolt Mounted Air Cylinder
BLOW GUNS
Button type Blow Gun
Lever type Blow Gun
LUB-AIR-ATOR
Filter • Regulate • Lubricate
Available separately or in combination
Drop-Forged Stainless Steel Blow Gun
Leg Mounted Air Cylinder
Base Mounted Air Cylinder
Couplers and Hose Fittings
Ferrules and Tools
Air Hose Various Diameters

Schrader
a division of SCOVILL

Schrader's complete air products line can meet your every need.

A. SCHRADER'S SON • *Division of Scovill Mfg. Co., Inc.* • BROOKLYN 38, N. Y.

QUALITY AIR CONTROL PRODUCTS

Gentlemen: Re: INDIANAPOLIS COKE

Coke produced during the loading of car NYC 869570

shipped July 24 shows as follows:

VOLATILE MATTER	.50
FIXED CARBON	92.00
ASH	7.50
SULFUR	.60
STABILITY NO.	151

HICKMAN, WILLIAMS & COMPANY

NOTE: When requested, an analysis notice precedes every car of Indianapolis Coke shipped.

Another H. W. *First!*

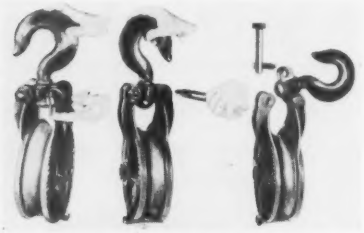
Hickman, Williams & Co.

(INCORPORATED)

CHICAGO · DETROIT · CINCINNATI · ST. LOUIS · NEW YORK
CLEVELAND · PHILADELPHIA · PITTSBURGH · INDIANAPOLIS

Established 1890

damage. Wide flange permits use of up to and including ¾-in. wire rope. A cast bead on the housing keeps rope in groove, even when the block is working in a horizontal position. Quick opening design permits easy handling in cramped quarters.

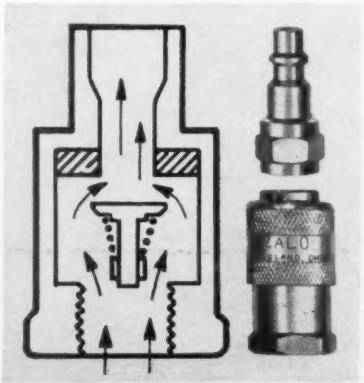


Block weighs 44 lb and is supplied with roller or bronze bearings. Sheave diam is 10 in. Over-all length is 23 in. with swivel hook and 19 in. with stiff shackle. Made by **Sauerman Brothers Inc.,** Dept. FYC, 620 South 28th St., Bellwood, Ill.

For More Details Circle No. 462—Page 212

PNEUMATIC COUPLINGS

PT series pneumatic couplings direct the airflow around the spring when it is compressed, instead of through it, to permit an airflow of better than 60 cfm at 100 psi in the ¼-in. size. A ⅜-in. size is made which permits a flow of more than 100 cfm at 100 psi. The sleeve of the coupling does not have to be re-



tracted to insert the connector. The coupler has a stainless steel shut-off valve and is fully piloted to prevent cooking. Made by **Zalo Mfg. Co.,** 4893 Van Epps Rd., Cleveland 9, O.

For More Details Circle No. 463—Page 212

FILING MACHINE

Filing machine is designed for filing, trimming and deburring a wide variety of small components such as castings, metal and wood patterns and welded joints. Disks and rings with various teeth arrangements are

LET'S LOOK at

OVENS for every baking requirement

OVENS that will be faster and less expensive to operate

OVENS that are designed to best fit your operation

Carl Mayer designs and manufactures all types of ovens as well as "specials" to meet unusual operating conditions. Most incorporate the Carl Mayer recirculating heating system with sealed combustion chamber that keeps gases from prematurely escaping into the load area. Cores and molds are baked evenly with no burning. Temperatures are always under control.

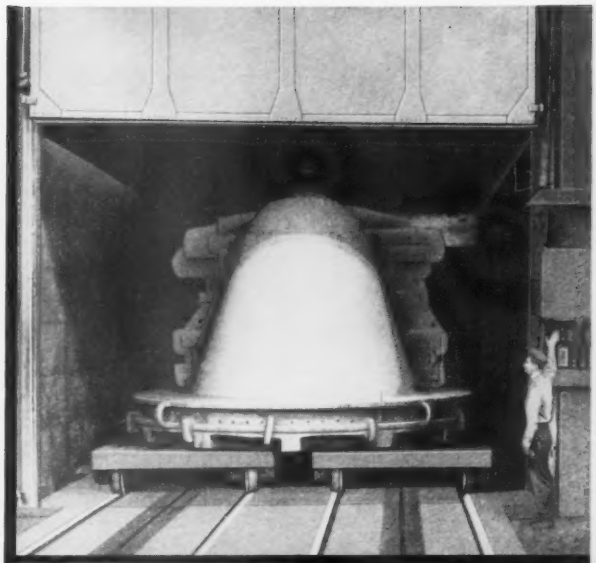
Write for Bulletin 53-CM

TOP RIGHT—This large car type mold oven is installed at Pittsburgh Steel Foundry. Its special triple slotted panel construction reduces heat loss 1/3. Fuel savings up to 50% over old conventional methods are possible. Drying time is often cut in half and temperatures are uniformly controlled.

MIDDLE RIGHT—This rack type core baking oven is at the Fremont Foundry Co., Fremont, Ohio. It is equipped with a recirculating combination gas-oil fired heating system.

BOTTOM RIGHT—Vertical Core Oven (unloading position) at A. C. Williams Company, Ravenna, Ohio. This oven is 11'-0" wide x 11'-0" deep x 45'-0" high.

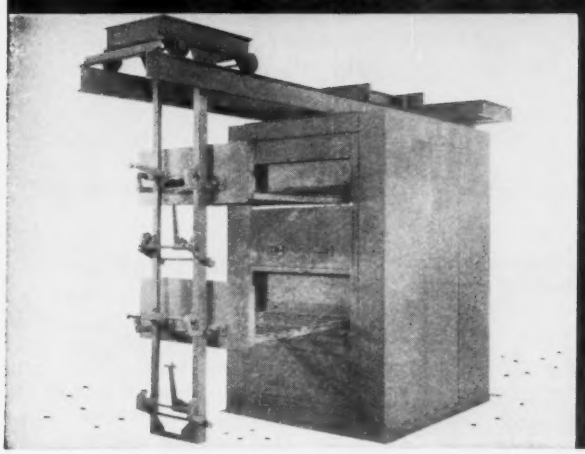
BELOW—Our standard rolling drawer type core baking oven. The heating equipment (not shown) may be mounted on floor beside unit or on the roof. Particularly adaptable to brass and aluminum foundries.



THE **carl mayer** CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories



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Acme

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INGOT MOLDS

Designed by
FOUNDRYMEN...
for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.

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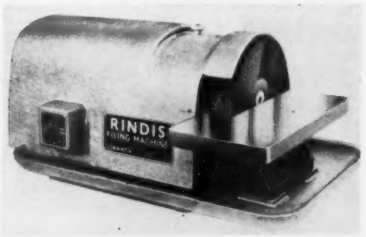
provided for use at different speeds on different materials and finishes. Disks cut without heat, abrasive or coolant, while also retaining their shape without redressing. Material removed contains no abrasive or



foreign matter and may be reclaimed. Unit is powered by a ½-hp continuously rated, ball bearing motor. Made by **Newage Industries Inc.**, Jenkintown, Pa.

For More Details Circle No. 464—Page 212

BALL PEEN HAMMER

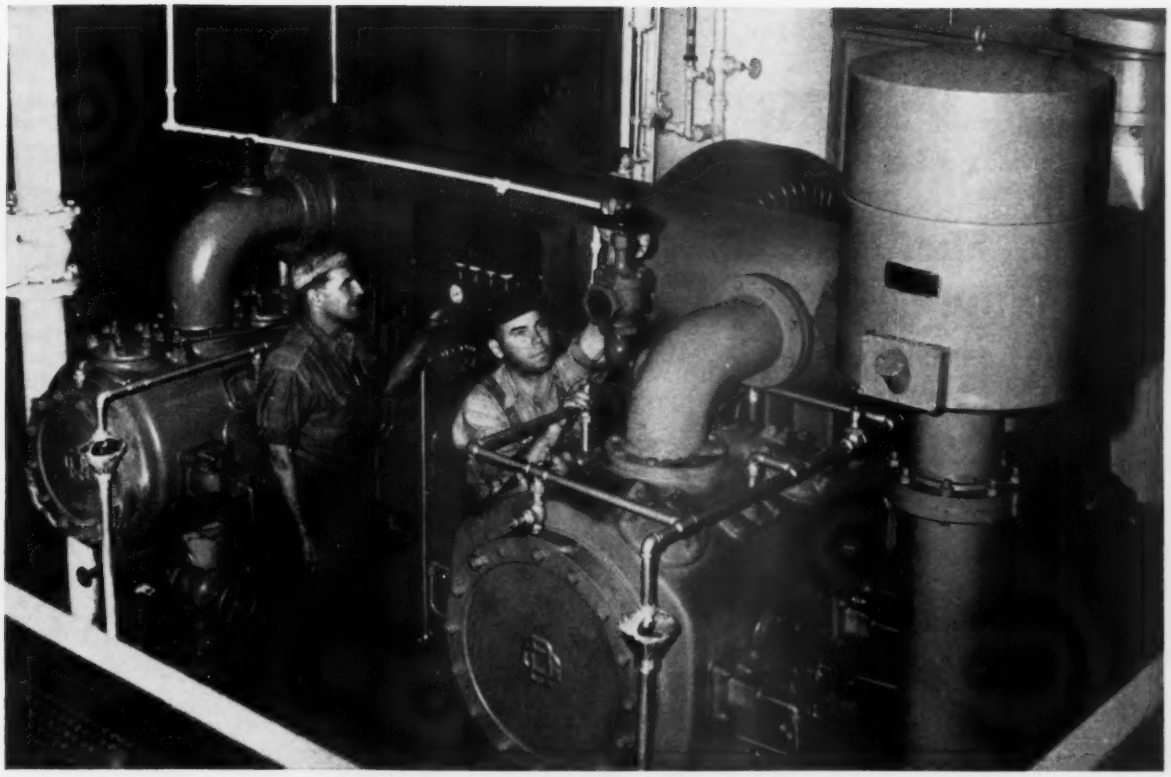
Ball peen machinists' hammer features a nonbreakable handle and improved functional head design. The handle, guaranteed nonbreakable in normal use, is made of fiber glass said to simulate the resilience of shock-absorbing hickory. The handle cannot rust, rot or corrode. Handle grip is covered with neoprene to prevent slipping. The tra-

ditional hump has been eliminated from the head to facilitate hammering in tight spots. Hammers come in head weights of 16, 20, 24, and 40 oz. Made by **Fayette R. Plumb Inc.**, 4837 James, Philadelphia, Pa.

For More Details Circle No. 465—Page 212

FIRE RETARDANT PAINTS

Albi No. 99 fire and heat retardant paints expand into a thick, sponge-like noncombustible mat when exposed to fire and/or heat with temperatures in excess of 300° F. This mat reportedly stops flame spread or travel and acts as a heat

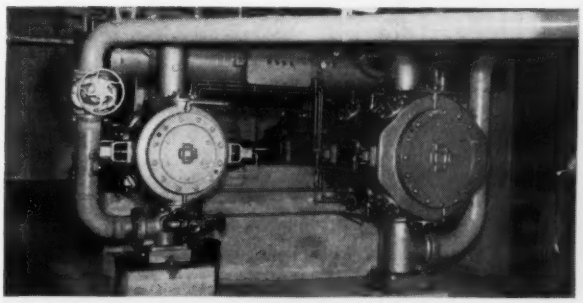


18 & 11 x 12 HAE compressor supplies 'round-the-clock air power in an aircraft plant.

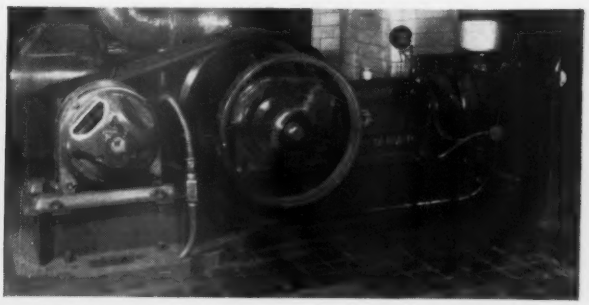
"WE WANT 'ROUND-THE-CLOCK AIR POWER— Gardner-Denver compressors give it to us"

Here's why they picked this Gardner-Denver heavy-duty, full-load compressor for continuous service:

- Completely enclosed main frame with removable, bolted cover plates . . . working parts easy to reach for inspection and adjustment.
- Gasketed covers keep oil in . . . dirt out.
- Two crankshaft counterweights for better balance . . . greater efficiency . . . longer service life.
- Factory-trained staff for technical and engineering service from convenient branch offices.



Midwest metalworking plant relies on this HAE compressor for air power. Ask for Bulletin HAC-36.



9 x 9 RX compressor delivers air to container plant. Ask for Bulletin HAC-40.

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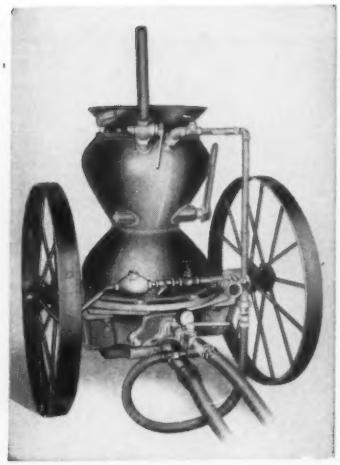
Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

MANY MAN HOURS SAVED BY REPAIRING CUPOLAS the "CEMENT GUN"® way



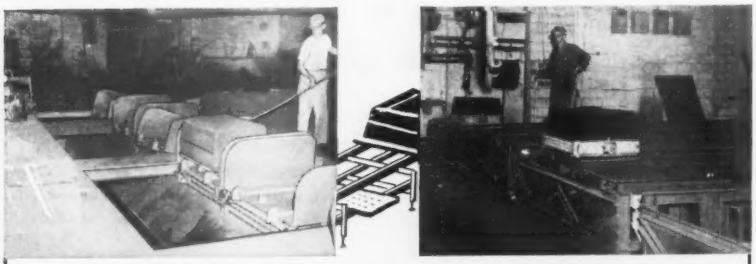
The CEMENT GUN is simple to operate; two or three of your own men can learn quickly and easily, after which they can make all your cupola repairs. With the CEMENT GUN they can place a lining 1" to 6" thick in one continuous operation. They can make patches in a "hot" furnace. They can place up to 5 thousand pounds of refractory material an hour. The CEMENT GUN method saves down time, saves material and extends the life of your present linings. Write today for our FREE bulletin #3000 and check our claims.

CEMENT GUN COMPANY

"GUNITE"® CONTRACTORS

1520 WALNUT ST., ALLENTOWN, PA.

Circle 702 on Inquiry Card—Page 51



SMOOTH FLOW OF MOLDS IS GUARANTEED Using the NOMAD Track and Pallet System

Molds are set on roller-equipped pallets, "rolled away" on conveyor track and poured. The molds are moved to the Mold Dump and dumped. Pallets then roll onto the lower return track automatically returning to the molding end of the conveyor where the Pallet Raiser lifts the pallet into position ready to receive the next mold.

This cycle of molds and mold handling equipment results in increased production, economy of space, reduced scrap and reduced manpower.

It's Low Cost Modernization!

WESTOVER CORPORATION
NOMAD EQUIPMENT DIVISION
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

NOMAD FOUNDRY EQUIPMENT

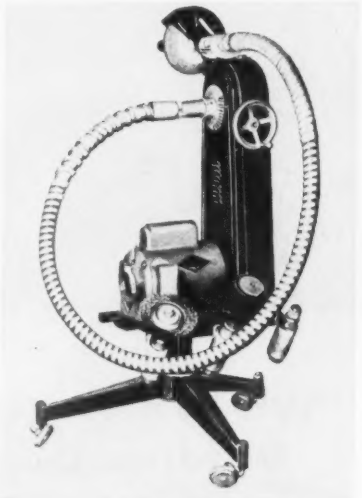
Circle 703 on Inquiry Card—Page 51

insulator, reducing the penetration of heat, slowing down the formation of flammable gases and protects the surface underneath against damage and loss of structural strength. Made by **Excelsior Varnish Inc.**, West 74th St. & New York Central Railroad, Cleveland 2, O.

For More Details Circle No. 466—Page 212

FLEXIBLE SHAFT MACHINES

Two larger models have been added to line of variable-speed flexible shaft machines engineered for a sequence of operations in the finishing of stainless steel and other metals. Machines are available from ⅛ to 1½ hp. Changes in speed from 2000 to 7200



rpm can be made by turning a hand wheel. All the machines feature extra light and easy bending high-speed flexible shafts. Made by **Wyzenbeck & Staff Inc.**, 223 North California Ave., Chicago 12, Ill.

For More Details Circle No. 467—Page 212

SAFETY HAT

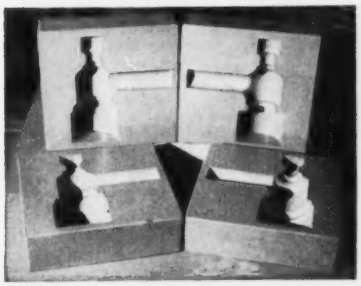
Aluminum alloy safety hat is ribbed for maximum blow resistance and is adjustable for sizes 6⅝ to 8. Called the Superlite, the hat is equipped with polyethylene head suspension, marked in various sizes in ⅛-in. divisions. The suspension is mildew, mold and fungusproof, doesn't mat up with grease and oil and is cleaned easily and quickly. Made by **Boyer-Campbell Co., Safety Division,** 6540 St. Antoine, Detroit 2, Mich.

For More Details Circle No. 468—Page 212

LOW HEADROOM CRANE

Two-ton crane fits into a height of within 12 in. It is an electrical hoist with lateral mobility either

16 HOURS VS. 65 HOURS



PLASTIC STEEL® A DEVCON PRODUCT

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CUTS 49 HOURS . . . MAKING THESE CORE BOXES

PLASTIC STEEL . . . originally developed for making tools, jigs and fixtures in metalworking plants . . . brought a revolutionary new method to this leading foundry* . . . chopping hours off the time required to produce core boxes, molds, duplicates of wood and metal patterns. Tremendous savings are being shown daily . . . making low cost patterns, repairing and altering patterns, filling large or small blow holes in ferrous and non-ferrous castings, repairing and rebuilding machinery, and making blow boxes and shell molds or driers.

PLASTIC STEEL becomes a strong, tough, metallic mass (similar to steel) within 2 hours after addition of the special hardening agent. Once hard, PLASTIC STEEL can be drilled, tapped or sawed with metalworking tools. PLASTIC STEEL is non-shrinking, non-expanding . . . adheres to ferrous and non-ferrous metals, wood, glass and many other surfaces.

*NAME ON REQUEST

SAVE UP TO 75% IN TIME... 25% to 75% OF TOTAL COSTS . . . OVER CONVENTIONAL METHODS OF PATTERN MAKING WITH PLASTIC STEEL

Prove these figures to yourself . . . read complete, documented facts in DEVCON'S Foundry Bulletin — write for your copy today.

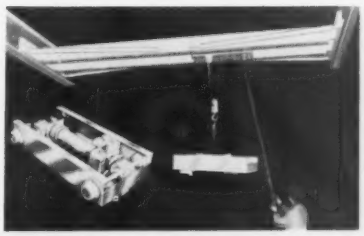
TECHNICAL REPRESENTATIVES AND DISTRIBUTORS IN ALL MAJOR CITIES

DEVCON CORPORATION

125 Endicott Street, Danvers, Mass.

Circle 704 on Inquiry Card—Page 51

hand or power operated. The crane can be furnished as a dolly or complete crane to specifications. It lifts



up to 50 ft. Construction is of steel. Made by **Atlas Industrial Corp.**, 849 39th St., Brooklyn, N. Y.

For More Details Circle No. 469—Page 212

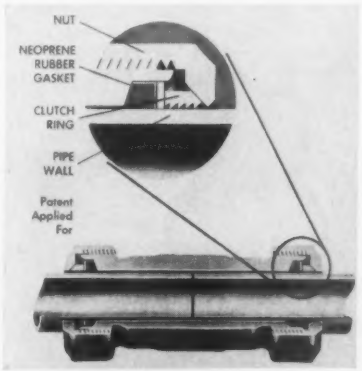
CONTROL VALVE

Small micro valve for air, gas, oil or water service functions as either a two-way shut off or two-way control. Applications are on automatic feed mechanisms, accurate filling operations, pilot control of main valves, pilot for diaphragm valves, control of single-acting cylinders and timing mechanisms. Valves can be used in place of limit switches. Operating pressures are from 0 to 100 psig. Orifice sizes are up to 1/16-in. in diam. The valve is ⅝-in. thick x 1½ in. wide x 1¾ in. high. Weight is 2 oz. Made by **Barworth Inc.**, Seven Industrial Pl., Summit, N. J.

For More Details Circle No. 470—Page 212

PIPE FITTINGS

Threadless pipe fittings will withstand traction forces up to 3600 lb and hydrostatic pressures ranging from 450 psi on 2-in. pipe to 5000



psi on ½-in. pipe. Fittings are factory assembled, ready for use in joining steel, wrought iron or plastic pipe. No threading, grooving, flaring, soldering or welding is necessary. Gripping action is achieved through a brass clutch ring with internal serrations which grip the pipe wall as the fitting nut is tightened.

ABRASIVE shot and grit, made here in the town of Springville, New York, is a specialty of ours, and we're more than a little proud of the fact it is famous for its fine quality. Our . . .

SHOT, whether it's steel or malleable, chilled iron or cut wire, is being used in tonnage quantities by some of the world's leading foundries and metalworking plants . . .

AND we never let the demand for our metallic abrasives lessen our constant watchfulness in the laboratory to make sure that quality is maintained. We strive for complete uniformity, economy and efficiency in making shot and . . .

GRIT. If you are having abrasive trouble, perhaps we have the answer here in Springville. Write us; you'll be in good . . .

COMPANY. A new catalog is available on request; just drop us a note.

ABRASIVE SHOT AND GRIT CO., INC.

Springville, New York

Telephone: Springville 1

Circle 705 on Inquiry Card—Page 51

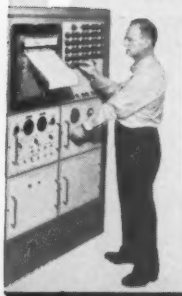
When Accuracy Counts...

Depend on Three Way Alloy Control

- *Quantometric*
- *Spectrographic*
- *Wet Chemical*

A complete, accurate and quick analyses service at surprisingly low cost covering:
Aluminum—Brass—Bronze—
Cast Iron—Ductile Iron.
Our facilities are geared to handle routine daily control and occasional miscellaneous samples. Mailing envelopes furnished gratis for convenient sample transmittal.

Let us be another department of your company.



Teletype PG-544, Phone FRemont 1-2345 or Write today for complete information.

SPECTROCHEMICAL LABORATORIES, INC.
P. O. Box 8781, Pittsburgh 21, Pa.

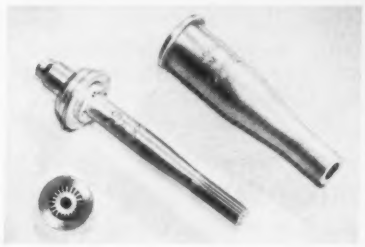
Circle 706 on Inquiry Card—Page 51

Fittings are available in couplings, adapters, 90 degree elbows and tees. Made by **Telsco Fittings Division,** 5422 Redfield St., Dallas, Tex.

For More Details Circle No. 471—Page 212

FLAME-CUTTING NOZZLES

Two-piece nozzles for flame-cutting with oxygen and fuel gases feature 12 to 20 extremely small outlets



for preheat gases to increase the rate of heat transfer and produce a nearly solid ring of preheat flames. Nozzles have a divergent bore design that increases to 1200 fps the speed at which the gas leaves the nozzle. Each two-piece nozzle consists of a brass internal section and a heat resistant copper cover. A complete selection of nozzles is available for a wide range of uses. Made by **Linde Co., Division of Union Carbide Corp.,** 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 472—Page 212

POWDER BLOWER

Self-contained, portable powder blower No. 58600 for application of dry Magnaflux powder operates directly from any air line and requires only 20 psi. Density of the cloud

of powder is controlled by simple adjustment and two pushbuttons permit selection of either powder or clean air. Blower weighs 2¼ lb empty. In operation, the gun is held level and at a distance from the area being tested. Particles gently

with Porcelain Products

CERAMIC STRAINER CORES

It's a fact, that Porcelain Products *ceramic* strainer cores will reduce casting rejects — provide higher quality, slag-free castings for your customers—and save *you* money besides. Porcelain Products ceramic cores will not spall, erode or disintegrate during pouring, resulting in a foundry product free of sand inclusions. Porcelain Products cores permit controlled pouring—reduce machining time. They will withstand high heat, thermal shock—can be stored indefinitely.

Try them . . . and compare the advantages of Porcelain Products ceramic strainer cores with the sand cores made in your own plant. Write today for samples, and complete informational folder.

63 years — PP INC. — **Porcelain Products, Inc.** FINDLAY, OHIO

Circle 707 on Inquiry Card—Page 51

flood the entire area, showing clear indications when cracks are present. Made by **Magnaflux Corp.**, 7300 West Lawrence Ave., Chicago 31, Ill.

For More Details Circle No. 473—Page 212

AIR-POWERED HOIST

Air-Powered hoist with 4000-lb capacity is fitted with either roller or link chain and its lifting and lowering speed varies from a creep to 10 fpm at full load and 90 psig air line pressure. Length of lift is 8 ft and the hoist operates with either a one-hand control bar or remote pendent control. A centrifugally governed, fully mechanical brake prevents slippage. An axial-piston compressed

air motor assures positive starts and stops and prevents motor burnouts during stalls. Hook to hook dimension is 23½ in. Made by **Gardner-Denver Co.**, Keller Tool Division, Grand Haven, Mich.

For More Details Circle No. 474—Page 212

GAGE BLOCKS

Grade "A" Shop-Blocks are designed for everyday shop measurement application and are reported accurate to + 6 millionths in. and — 2 millionths in. from actual size engraved on each block. Set 860 contains 84 blocks varying in size from 0.050 to 4 in. and will produce any dimension 0.200 in. to over 20 in. in increments of 25 millionths. Set 380 contains 36 blocks and will produce any dimension between 0.300 in. to over 8 in. in increments of 50 millionths in. Made by **DoAll Co.**, Des Plaines, Ill.

For More Details Circle No. 475—Page 212

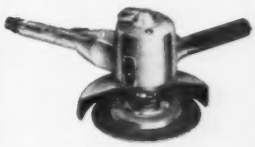
VERNIER LAYOUT COMPASS

Precision layout compass and scriber permits compass work to a maximum 12-in. diam with a 6-in. scale

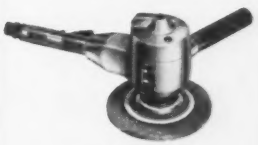
Foundries and fabricators are finding the new Cleco 1500 Series Air Grinders ideally suited to snagging and deburring, cleaning up rough castings, removing flash and parting lines and general grinding, sanding and wire-brushing operations. Compare these features with those of other air and electric tools before you buy:

1. **Light weight**—magnesium alloy housing
2. **Ease of control**—thumb-tip lever throttle
3. **Quiet operation**—muffler handle minimizes noise
4. **Low maintenance** — precision components make the most of trouble-free air-power principle
5. **Versatility**—speeds and guards for all grinding, sanding and wire-brush applications

Cup wheel and adjustable guard



7" guard and cut-off wheel



Sander

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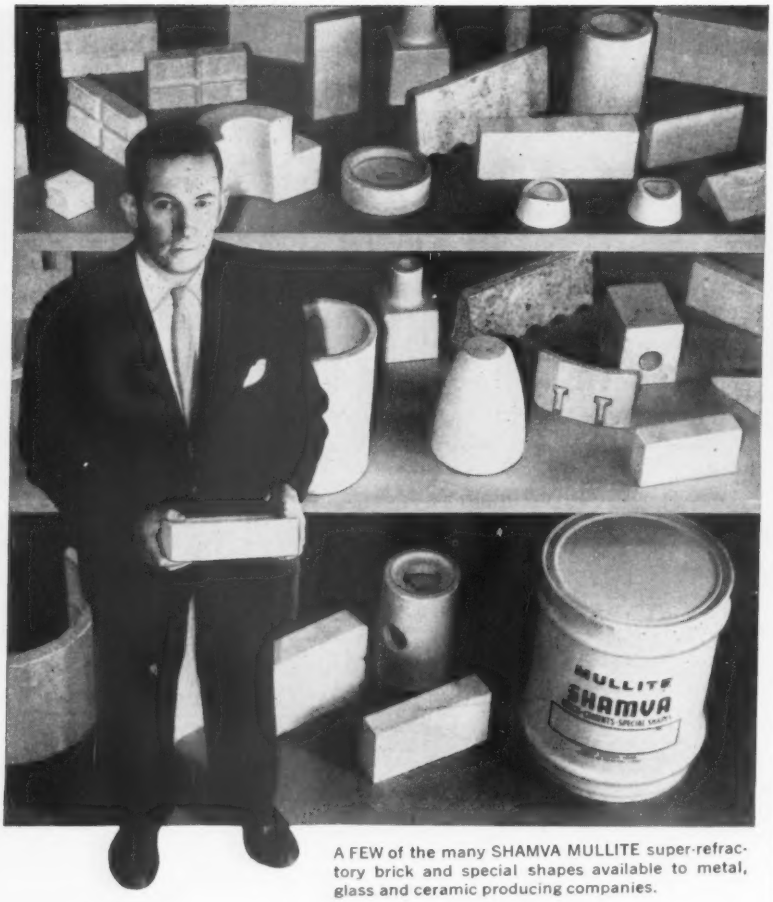
Circle 708 on Inquiry Card—Page 51



A FEW of the many SHAMVA MULLITE super-refractory brick and special shapes available to metal, glass and ceramic producing companies.

For refractory economy . . .

SHAMVA

MULLITE PRODUCTS

Each of the SHAMVA products shown possesses a unique combination of properties that sets SHAMVA Mullite apart from other refractory products . . . and gives you the true economy of long refractory life:

- **high melting point**
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You'll like the uniform high quality of SHAMVA Mullite super-refractory brick and special shapes. And you'll like the practical, economical answers to refractory problems The Man from Mullite can provide.

The Man from Mullite—a trained field engineer—is ready to recommend or develop SHAMVA Mullite Products for your particular service. Why not call him soon?

For free brochures, write:

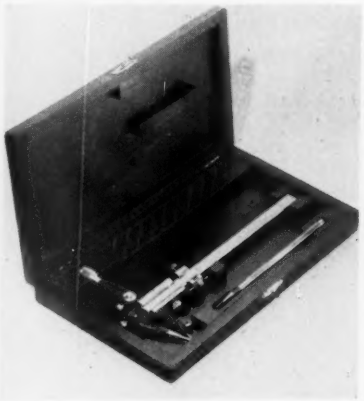
Mullite Works, Refractories Division,
H. K. Porter Company, Inc.,
Shelton, Conn.

MULLITE WORKS

REFRACTORIES DIVISION

H. K. PORTER COMPANY, INC.

and 24-in. diam with a 12-in. scale. A vernier is provided for reading to 1/128 in. or 1/1000 in. Compass is of the beam type with the scale acting as the beam. Compass is said to be ideal for layout work on metal



in tool rooms, die and pattern departments and similar work shops. Made by **Titan Tool and Supply Co., Dept. J., 1419 Hertel Ave., Buffalo, N. Y.**

For More Details Circle No. 476—Page 212

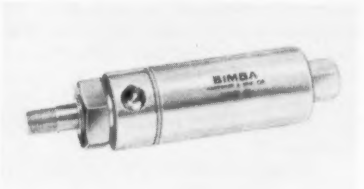
FACE SHIELDS

Headrest carries a choice of four face shield visors which fasten to the front of a wide spark deflector, pivoted to the headband. A fiber visor with welding lens (for scarfing, furnace work and heavy gas welding), a metal-bound plastic visor, a wider, all plastic visor in clear plastic or shades of green (for metal pouring and finishing, spot or flash welding, woodworking) and a 24-mesh wire screen visor (for furnace work and drop forging) are available. Made by **Jackson Products, Air Reduction Sales Co., Division of Air Reduction Co.,** Warren, Mich.

For More Details Circle No. 477—Page 212

AIR CYLINDERS

Six models of "throw-away" stainless steel air cylinders are available with 1 1/16 in. bore single and



double acting cylinders in 1, 2 and 3 in. strokes. All models contain vinyl "U" cups and the stainless steel bodies are reported to extend cylinder life beyond the life of conven-

tional cylinders. Made by **Bimba Hardware & Mfg. Co.**, 101 Main St., Monee, Ill.

For More Details Circle No. 478—Page 212

CALCULATING DEVICE

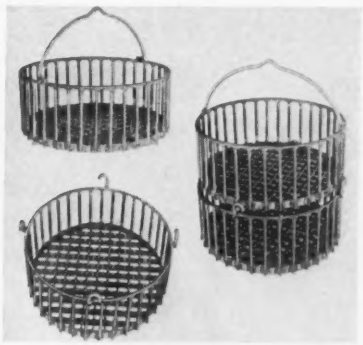
Automatic calculator for all commercial and technical calculations is made of aluminum, weighs 1 oz with case, is 3 in. in diam and is said to

provide the performance of a 10-in. slide rule. The controller can be used for multiplication, division, cost of merchandise, fuel consumption, speeds, percentages, margins, circle calculations, areas, volumes, squares, cubes, fractions to decimals, inches to centimeters, etc. Distributed by **Silver Bells Ltd.**, Pacific Bldg., 600 Sixteenth St., Oakland, Calif.

For More Details Circle No. 479—Page 212

HEAT TREATING BASKETS

Heat treating baskets are made in two sections for use together or separately, depending on the work load. Sections are easily hooked together.



Each basket is 32 in. in diam and 12 in. deep. Framework is built of ⅝-in.-diam rod for vertical braces and top ring. Bottom ring and grid are of ¼ x 1½ in. flat bar stock. Material is type 330 alloy. Made by **Wiretex Mfg. Co.**, 10 Mason St., Bridgeport, Conn.

For More Details Circle No. 480—Page 212

HEAT

can't beat this QUAKER conveyor belting!

It's Quaker's Kaloric — engineered to convey hot materials at temperatures of 350°F. and above.

All Quaker Kaloric belting is made with specially-developed compounds designed to give best resistance to heat. And Kaloric's special cover resists heat that causes ordinary belt covers to harden and crack. Skim coat between plies for insulation and extra flex-life.

Available in any length . . any number of plies in widths up to 72" . . . any cover thickness. Want extra safety, extra belt life? See your Quaker-Quaker Pioneer Rubber distributor today about Kaloric conveyor belting!

For more information write:
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Philadelphia 24, Pennsylvania,
or Pioneer Works, Pittsburg, California

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QUAKER RUBBER DIVISION

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We'll give you full details on request.

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when you advertise in FOUNDRY!

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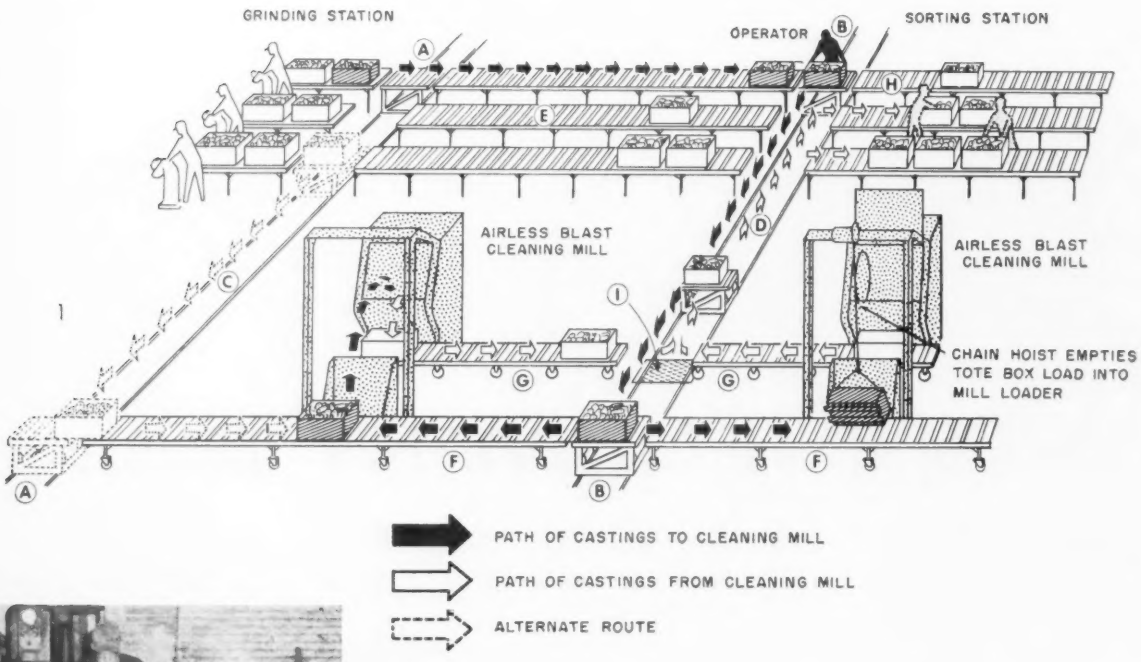
a PENTON Publication Penton Building, Cleveland 13, Ohio


GRINDING STATION
OPERATOR
SORTING STATION
AIRLESS BLAST CLEANING MILL
AIRLESS BLAST CLEANING MILL
CHAIN HOIST EMPTIES TOTE BOX LOAD INTO MILL LOADER
PATH OF CASTINGS TO CLEANING MILL
PATH OF CASTINGS FROM CLEANING MILL
ALTERNATE ROUTE

Handling System Facilitates Blast Cleaning Operation

AN ingenious gravity roller conveyor system at Dalton Foundries Inc., Warsaw, Ind., permits one man who operates two airless blast mills to move malleable castings from the grinders to the cleaning mills and from there to the inspection stations. The system consists of two shuttle cars, *A* and *B*, in Fig. 1, which roll on rail tracks, *C* and *D*, and four banks of roller conveyors.

Conveyors at *E* carry tote boxes away from the grinders; conveyor *F* carries them to the loaders for the two airless blast machines; conveyor *G* moves them to the unloading station in front of the cleaning machines, and conveyors at *H* convey them to the inspectors.

Because the unloading conveyor *G* must be lower than other conveyors in the system, a hydraulic lift is provided at point *I* to permit lowering the shuttle cars to the proper level. The lift table is shown in Fig. 2 in the raised position after receiving a tote box load of castings from the low-level conveyors. The tote box now will align with other conveyors in the system.

Discharging the contents of a tote box into a cleaning machine loader is handled very simply. A two-pronged lifting hook, attached to an electric chain hoist, is inserted into holes in the back of the container, as illustrated in Fig. 3. Actuating the hoist raises the back of the box, causing it to pivot at the front, thereby dumping the work into the loader bucket. The tote box then is conveyed around to the front of the mill for unloading, whereupon it is moved up to the conveyors at *H* where the work is inspected.

The airless blast mills used in the system are a product of Wheelabrator Corp., Mishawaka, Ind., and the conveyors were made by Mathews Conveyer Co., Elwood City, Pa.

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PRODUCTS
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CUPOLA REFRACTORIES

Photograph courtesy of Whiting Corporation

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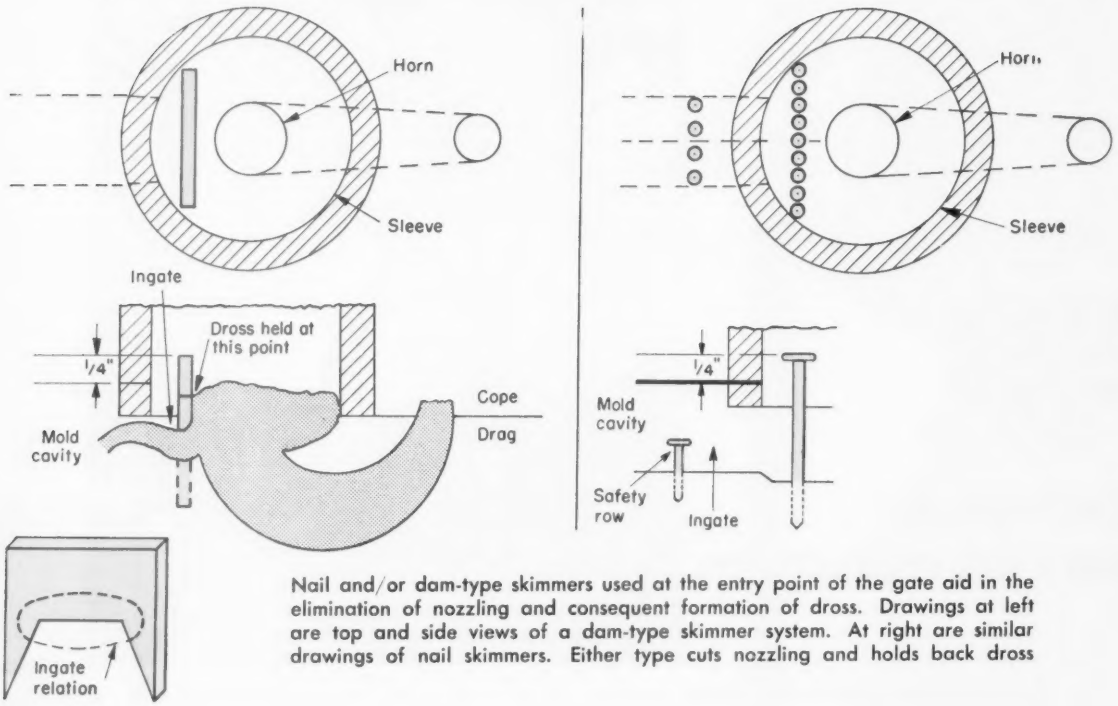
Trouble Shooting

By C. W. AMMEN



Nail and/or dam-type skimmers used at the entry point of the gate aid in the elimination of nozzling and consequent formation of dross. Drawings at left are top and side views of a dam-type skimmer system. At right are similar drawings of nail skimmers. Either type cuts nozzling and holds back dross

Casting Aluminum Bronze

Dear Charlie:

I am somewhat confused, to say the least. We're having terrific losses in making a simple flange bushing in Class I aluminum bronze. We get oxide, poor fracture, soft castings, hard castings, etc. The confusion occurs in a difference of opinion on correct practice.

One expert, for example, advises in a well written text, to use aluminum as a deoxidizer and to avoid stirring the melt. Still another expert says to use magnesium and to stir hell out of the melt. Number 1 says don't use strainer cores because they increase the area of exposed stream, and number 2 to use strainers on everything. A good friend of mine, a metallurgist, also states that I cannot use foundry remelt, but should exchange the risers, gates and scrap castings for new ingot.

Sincerely,
Sam

Dear Sam:

Right! There is a difference of opinion about most methods, and in many instances each method will produce good end results. I will not take either side, but will tell you about my experience and observations.

It sometimes is difficult to understand just what an author is getting at. You must for the most part riddle out all the information and adopt what gives you the best results and will fit your set of conditions. Many pieces of scrap are products of departures from some old, basic rules and practices such as proper ramming, the use of the vent wire, properly dried molds (when needed), gating to avoid a direct obstruction of metal flow at the point of entry, etc.

Of course, each casting presents its own problems as to gating, etc., but certain basic practices should be adhered to with all castings.

Let's take up deoxidizing first. Some operators advise that none be used. Others use aluminum, which has been employed successfully for some time. It will alter the specification and resulting physicals, however, if not used properly. For this reason, some persons prefer magnesium. The amount of magnesium retained in a heat after treatment is a flea's flea and apparently makes no difference in the melt.

The normal procedure is to plunge pure magnesium (0.25 per cent by weight) to the bottom of the crucible or ladle and stir well. Pour a test specimen about 2½ in. in diameter and 2½ in. deep and observe shrinkage. If the metal blows, puffs or otherwise purges, repeat the procedure until a satisfactory sample is produced. When aluminum is used, it may be necessary to add so much that what is retained increases the hardness.

Your friend is far off base about

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should have an important bearing on any foundry's decision to standardize with one bentonite brand. Any abrupt change in the clay's characteristics due to depletion of the supplier's original reserves can needlessly disrupt casting operations in the future.

More than 200,000 tons of the finest colloidal bentonite, YELLOWSTONE, are stockpiled at Magcobar's Greybull, Wyoming, facilities, along with more than 20,000,000 tons of the purest known western bentonite ore in reserve. The world's largest mine — the world's largest reserves!

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for Magcobar's YELLOWSTONE continues to increase as more and more progressive foundries discover that up to ten percent less of this pure, uniform clay is required. Uniform green strength, tensile strength and permeability are controlled at the plant to assure consistent specifications.

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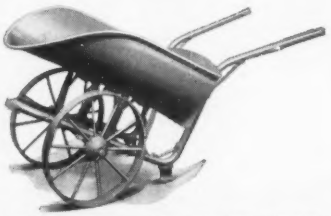
FORWARD DUMP BARROWS for FOUNDRIES

No. 102-A Barrow. Single steel wheel with 2" face, 16" diameter and 12 spokes.



No. 113-A Barrow. Two steel wheels with 2" face, 18" diameter and 10 spokes.

Here are two well-balanced charging Wheelbarrows for heavy duty foundry service. Handle loads up to 1000 lbs. Sturdy, welded, all-steel construction. Single wheel or double wheel. Available with zero pressure cushion type wheels or 4 ply pneumatic tired wheels with roller bearings. Immediate shipment.

Write for Circular No. 58.

Sterling FOUNDRY EQUIPMENT

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

Circle 713 on Inquiry Card—Page 51 A 5792-⅓

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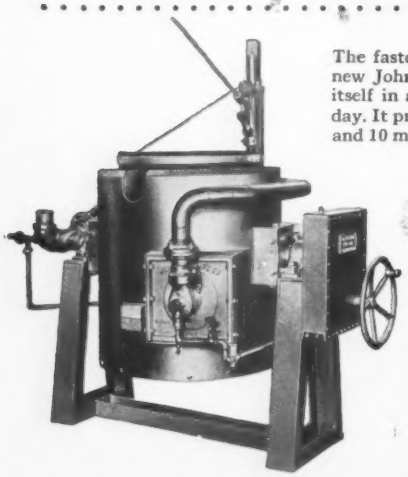

The faster the furnace—the lower your cost. The new Johnston No. 400 Crucible Furnace pays for itself in a hurry by hustling more heats into every day. It produces 1200 lbs. of molten brass in 1 hour and 10 minutes on successive heats, gas fired (may also be oil fired as is model shown). Johnston burners, blowers and experienced engineering combine to produce unusual speed with economically low fuel consumption.

A new enclosed tilting mechanism makes tilting easier than ever before and it may be electrically driven.

Crucible life and lining life are extremely good. Trunnions are adjustable for best balance and are supported on large pillow block bearings. A simple, convenient cover lifting mechanism is operated from the front of the furnace.

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the use of remelt. You should, however, keep the return from various grades separated to prevent cross breeding or from getting aluminum bronze mixed with other lots. In the event of hardness or softness, make adjustments by tracking with a Brinell hardness tester. Since an improperly mixed heat shows an abnormally high Brinell, be sure to stir the melt well before pouring a bend bar. Take Brinell readings from the drag section of the bend bar.

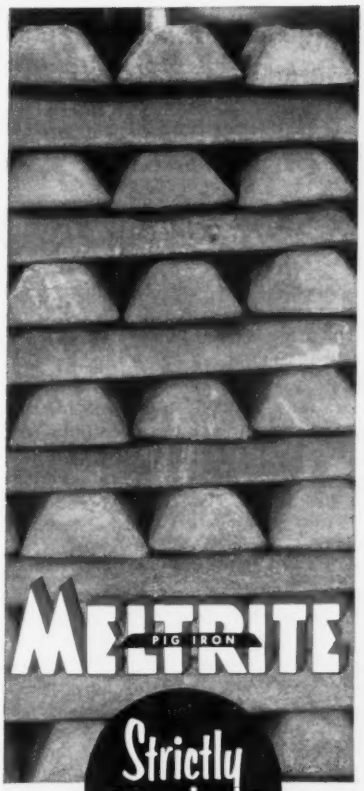
If the Brinell is too high, add 0.25 per cent copper; if it's too low, add 0.25 per cent aluminum and make another check. Repeat the treatment or additions, if necessary, stirring them well each time before testing. Fracture will indicate whether a heat is properly mixed, without a separation of elements. Numerous types of aluminum bronze fluxes and covers, both metallic and nonmetallic, are available, incidentally.

Strainers for the most part are not recommended for aluminum bronze because they divide the stream and may produce nozzling, which can be responsible for dross. The best all-round system is a series of true skimmer gates, nail skimmers, and manual paddle skimmers. If at all possible, gate into the bottom of a riser with an inverted horngate with a few chokes, skimmers and direction reversers between the sprue and horn intake. Use nail and/or manual paddle skimmers at the entry point of the gate.

Long falls should be avoided by stepping or staggering the sprue on its way down. Seek directional solidification by the use of chills or risers and correct gating. Risers should be not only large enough, but also correctly padded and fitted at points of attachment. The use of

"It's melting the brass for the church bells."

Circle 714 on Inquiry Card—Page 51



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Circle 715 on Inquiry Card—Page 51

insulating sleeves, risers and hot-top compounds helps to produce sound castings.

In large castings it also is wise to use a facing, which can be skin dried, of half system sand and half sharp sand, bonded with bentonite and containing a small amount of fine pitch. Black the mold face with a good grade of plumbago (dry), spray it with glutrin water or molasses water and skin dry it well, preferable overnight. The mold should be well vented, both cope and drag. Remember, it's hard to do any damage by over venting, whereas hard ramming and no venting cause havoc. Don't overslick. Patch with your hands or fingers in preference to a tool if at all possible. Use good boards and flask equipment, and clamp and weight properly.

An effective skimmer to prevent scuff or dross from going into the casting can be made from 16-gage iron, as shown in Fig. 1.

It is very necessary that aluminum bronze should enter the mold cavity with minimum turbulence and nozzling, in such a manner as to fill the mold cavity by simple and quiet displacement. The only method to accomplish this is to bring the metal almost to a dead stop just prior to mold entry, at which point the gate must be so designed as to prevent nozzling and so located as to prevent impingement, fall, swirling or sucking.

Study the job carefully and design the gating with a simple, commonsense approach. Do not alter or change a satisfactory gating system. There is a narrow range to work in with respect to choking, and slowing down the metal too much can lead to misruns. In other words, you have to fill the cavity slowly enough to prevent turbulence and fast enough to run the casting within a given temperature range. Of course, it goes without saying that you should pour close to sprue and maintain a choke.

Sincerely,
Charlie

Publishes New Volume of Safety Talks for Foremen

A new volume of "Five Minute Safety Talks for Foremen," the seventh such book, has been published by the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill. It contains 52 talks on accident prevention, prepared by Roland F. Blake, a leader in safety engineering and co-author of *Industrial Safety*, a book on accident prevention fundamentals.

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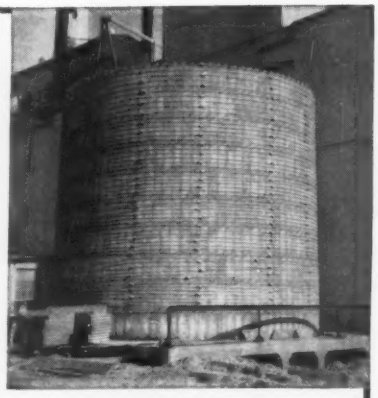
Circle 716 on Inquiry Card—Page 51

Neff & Fry Bin Being Erected for Handling Silica Sand



When photographed, this Neff & Fry Super-Concrete Stave Bin was being erected for the Ottawa Silica Co., Ottawa, Ill. It is the first of two 28′ x 40′ bins which are now completed and in use. Silica sand is supplied principally to glass manufacturers, foundries, and concrete producers.

Through our experience in building thousands of bins, we have mastered the techniques of handling and storing virtually all kinds of flowable bulk materials. This knowledge is at your service upon request. You are invited to communicate with us.

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THE NEFF & FRY CO. • 214 Elm St., Camden, Ohio

NEFF & FRY SUPER-CONCRETE STAVE STORAGE BINS

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machined all over and engineered to fit the needs of your foundry

Write or phone for further information

Anderson Pattern Inc.

MUSKEGON MICHIGAN

Circle 718 on Inquiry Card—Page 51

Suggestion Plans—Their Operation and Benefits

Employees Make Possible Production Economies

By Robley D. Stevens

AMERICAN industry is famous for its ingenuity, and management is widely agreed that suggestion systems enable it to draw on the ingenuity of its employees. A properly operated suggestion system also can pay dividends not only in obtaining valuable ideas and organizational savings, but also in improved worker morale and co-operation.

The basis for a suggestion system is simple enough. Each worker in a plant spends most of his workday performing one or many functions. He may know the details of his job better than anyone else, including his supervisor or foreman. The worker also looks at his job from many different points of view. Often, he may, and in practice does, have an idea which nobody else has thought of.

He may, however, be reluctant to suggest the idea because he is afraid that his supervisor or foreman will think it a reflection on him for not having thought up the bright idea himself. Or he may feel that management will get all the financial benefits from his idea. If the company has no recognized channel for making suggestions, he therefore does not offer any.

Setting Up a Suggestion System—There are, of course, certain essentials for a good suggestion system. For instance, some individual in your foundry should have the responsibility for receiving employee suggestions and determining that they are properly considered.

The individual chosen for this job should have imagination and be receptive to new ideas. He also should be tactful and able to win the confidence of employees, and he must not seek any personal profits from ideas submitted. He needs enthusiasm and persistence, and he will have to see that suggestion boxes, forms and files are kept in good condition. Furthermore, he should be responsible for presenting employee suggestions and ideas to management for appropriate action.

Rewarding Employees—Rewards motivate interest. They never fail if they are the right ones. The reward should have a direct relationship to the suggestion made. Experience indicates that the more generous the rewards, the more effec-

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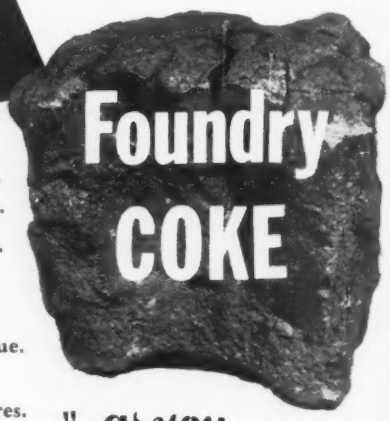
Terre Haute Special



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tive the suggestion system and the greater the savings in the long run. A minimum amount should be established, but there should be no maximum reward. Of course, rewards should be based on the net savings expected from use of the idea. Some companies reward the suggestor a minimum of $50, and awards of as much as $3000 or more have been made.

In determining the amounts to be paid, remember that rewards are not a matter of generosity, but of stimulating employees to think constructively about the business and to help management bring about improvements and economies. Because of the infinite variations of financial rewards, your management can work out the best arrangement. Constructive suggestions from employees, except those in the form of "gripes," should be considered and acted upon fairly and promptly.

Who Is Eligible?—Usually all employees except management personnel are eligible to participate in the suggestion system. Employees are the grass roots as well as the pipeline by which your management can move ideas. An employee always should be at liberty to make suggestions and to consult freely with his supervisor for help and guidance.

Patentable Ideas—Sometimes an employee suggestion involves a patentable idea. Management policies about such ideas vary widely. Your foundry may require the employee to sign an agreement stating that the firm will get all rights to an invention developed by the employee after a substantial reward has been made outright. In any event, for obvious reasons, legal counsel should be consulted about any patentable ideas.

Use the Ideas—Your management cannot increase foundry production, lower operating costs or increase employee efficiency with ideas that stay in the files. They should be analyzed and considered from every viewpoint. Moreover, most employees are just as interested in seeing their ideas applied as they are in receiving a reward.

Your management should win the support of the supervisory staff for installing and operating a suggestion system. Soliciting employee suggestions and ideas can help to improve morale and make supervision easier as well as find out which employees originate constructive ideas that may enable them to handle more important jobs. Remember, ideas that may seem trivial to the foreman may be a sincere expression on the part of the employee who is trying for a

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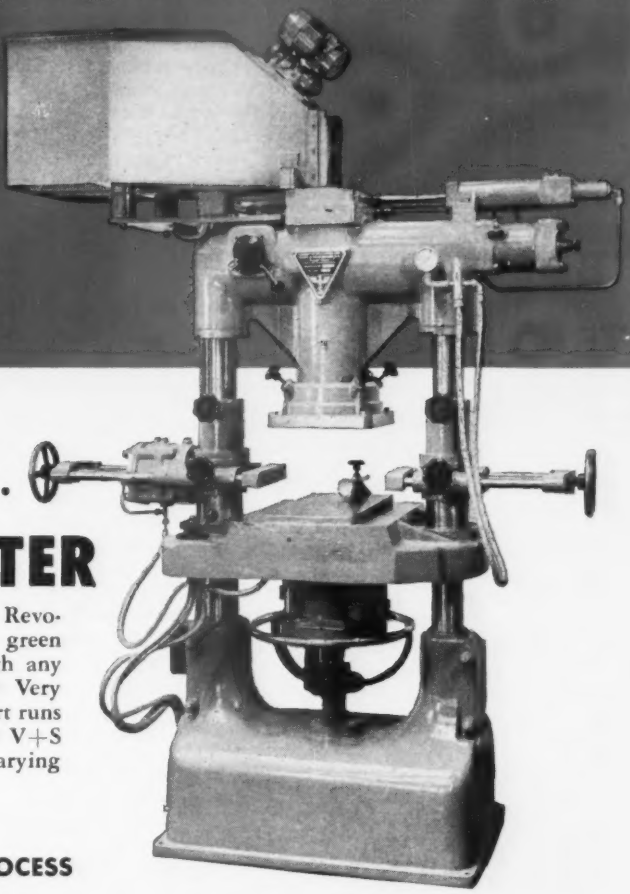

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. . . the world's fastest core making machine! Revolutionary new technique. Extremely high green strength "stand up" cores can be made with any binder • Negligible wear on wood boxes • Very little air is used • Economical for large or short runs • Core boxes can be changed in one minute • V+S Core Shooters are available in 4 sizes of varying capacities.

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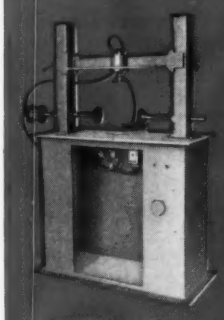

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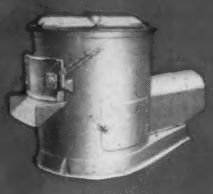

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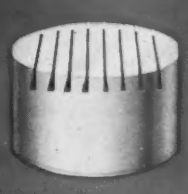

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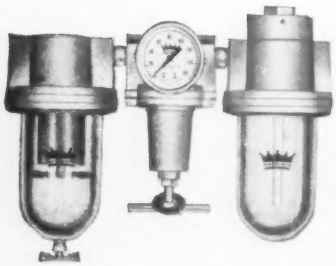

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reward. Attainment of such an interest is in itself worth while.

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Paper on Factors Affecting Carbon Pickup Wins Award

Michael Perch and Charles C. Russell, Koppers Co., have been named recipients of the Bituminous Coal Research Inc. Award for the best paper pertaining to coal and derived products given at the 1957 spring meeting of the American Chemical Society. Their paper was entitled "A Test for Assessing the Factors Affecting the Carbon Pickup in the Cupola Melt" and was presented by Mr. Perch.

Bituminous Coal Research Inc. established the semiannual award in co-operation with the Division of Gas and Fuel Chemistry of ACS to stimulate preparation of papers relating to coal and derived products and to improve their presentation. A cash prize and certificates for each of the authors were presented at the May meeting of Pittsburgh section of ACS by Dr. H. J. Rose, vice president and director of research, Bituminous Coal Research Inc.

Plans Fall Publication of Industrial Truck Handbook

The Industrial Truck Association, Washington, will publish a *Handbook of Powered Industrial Trucks* this fall. Plans call for distribution of the 94-page manual by October.

The result of more than two years of combined efforts by various association committees, the book is divided into five sections covering selection, procedures and operation. A 20-page section devoted to engineering data is said to be the most thorough collection of technical information on industrial trucks ever published.

Advance orders may be placed with the association, at Ninth and F Streets, Washington 4, D. C. Price is $5 per copy.

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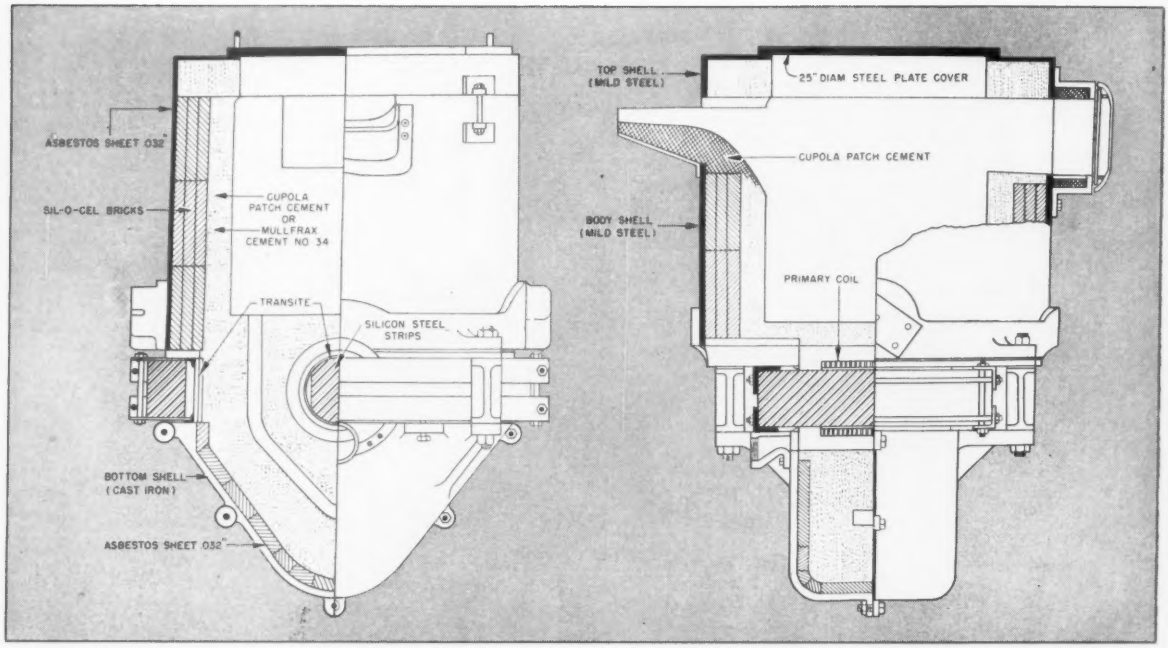

Fig. 1 and 1A—Left, front view of the low-frequency induction melting furnace with cross section showing linings used to melt cast iron. On right, a side view with cross section which also shows similar linings

Fig. 2—Copper form used to make secondary hole in lining of the low-frequency induction furnace

MELTING CAST IRON

in Low-Frequency Induction Furnaces

By EARL J. BUSH and PAUL O. ADY
Master Mechanic *Chief Quarterman*
U. S. Naval Gun Factory Foundry
Washington, D. C.

AT the U.S. Naval Gun Factory, Washington, various types of furnaces have been used to melt iron for castings. They include coal-fired and gas-fired crucible furnaces, cupolas, basic Heroult electric arc furnaces, a Detroit electric arc rocking furnace and Ajax-Wyatt low-frequency induction furnaces.

The first four types have been used in other foundries to melt iron, and the procedures are fully described in literature. There is no other record, however, of low-frequency induction furnaces having been used to melt cast iron. This paper therefore describes the history, construction and operation of 125-kw, 440-v, 60-c, low-frequency induction furnaces (nominal capacity 1000 lb) for melting iron at the Naval Gun Factory.

History—In June, 1947, the Naval Gun Factory received an order to produce 1,200,000 small cast iron castings, each weighing 3 lb. To avoid interference with the production schedules of other castings, a separate system for producing 235 14 x 24-in. sand molds per eight-hour day was provided. The system covered an area approximately 20 ft wide and 125 ft long.

A high-speed muller prepared the molding sand, which was carried by a belt conveyor to hoppers over two molding machines, one for producing drags, the other for copes. Copes and drags were deposited by the machines on parallel gravity roller conveyors;

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Fig. 3—View of low-frequency induction furnace in operation. Five heats of cast iron, 1000 lb per heat, are made in a furnace in eight hours

cores were set in the drags and the copes placed on the drags to complete the mold. The gravity roller conveyor moved molds about 55 ft south, turned east for about 12 ft and then north for about 100 ft. Iron was poured into molds on the 100-ft section.

The molds were allowed to cool, pushed to the end of the conveyor and hoisted onto a small shakeout unit directly in front of the muller and behind the machines. Sand falling through the shakeout was returned to the muller by bucket elevators. Empty flasks were placed directly behind the molding machines for re-use. Castings were pushed down a gravity roller conveyor into a steel tub which was used to convey them to the cleaning operations. Eight castings were made in each mold, and 35 lb of metal was required to fill a mold. A supply of 400 lb of molten iron every 20 minutes was needed to maintain continuous production.

Molten iron for this purpose first was prepared in gas-fired crucible furnaces, but this method was abandoned because of short crucible life and excessive furnace damages. The next step was the use of our idle low-frequency induction melting furnaces. Several preliminary heats were made to determine the best refractory linings, and two refractories were found to be suitable for lining these furnaces.

For Naval Gun Factory purposes and conditions the induction furnaces were found to be satisfactory for producing a continuous amount of molten cast iron. At the present time, they supply all iron at the Naval Gun Factory for small castings.

Construction of the Furnace—The materials required to line one low-frequency induction melting furnace include the following:

1. 2000 lb of refractory cement, which may be either Mullfrax Cement No. 34 or Cupola Patch Cement. The Mullfrax Cement is ready for use as delivered. Cupola Patch Cement is prepared for use by mixing 100 parts by weight of cement with 4 parts by weight of warm water for five minutes in a sand muller. 2. Sil-O-Cel insulating bricks. 3. About 20 sq ft of asbestos sheet 0.032 in. thick.

One melter and one helper require 32 hours to line one furnace, including four to five hours for tearing out the old lining. The lining lasts for three months of continuous use, 24 hours per day. For five days a week, it melts iron, and for two days (the weekend), it holds molten iron. Repairs are made once a week by chipping out damaged areas and patching them with cement.

Figs. 1A and 1B show front and side views of one of these furnaces with cross sections which show linings used to melt iron. The following procedure is used to line the furnace:

The bottom cast iron shell is set on a structural steel stand and lined with a layer of 0.032-in. asbestos sheet. Water glass is used to stick the asbestos to the shell. A 1¼-in. thick layer of bricks is laid on the asbestos, with refractory cement used as a binder. Refractory cement is rammed into the shell as hard as possible with a hand air-hammer, up to the bottom of the secondary hole.

The form (Fig. 2) for forming the secondary hole is put in position and clamped in place. It originally was composed of ⅛-in. thick copper strips welded together to make a hollow form having a cross section 4½-in. wide and 1½-in. thick, with a copper strip welded at the centers of the 4½-in. sides to prevent the hollow form from collapsing when the refractory cement is rammed around it. This form, which is melted away by the first batch of molten iron produced in the furnace, now is made as a copper casting. Copper is used to permit use of the furnaces for either cartridge brass or iron melting. The form also can be made of cast iron or cartridge brass for use in melting heats of each, respectively.

Next, the refractory cement is rammed up to the bottom of the hole for the primary coil, and the clamps are removed from the copper form. A split collapsible wooden pattern for the primary coil hole, Transite plates ⅝-in. thick x 6 in. wide and a cast iron plate are set in place. Refractory cement is rammed in up to the top of the cast iron plate.

Position Steel Body Shell

The steel body shell is positioned on the cast iron plate and bolted in place. The steel body shell and the top of the cast iron plate are lined with 0.032-in. asbestos sheet stuck to the base with water glass. The bottom third of the body shell is lined with bricks to form a three-layer lining about 3½-in. thick, and cement is used to hold the bricks together. Refractory cement then is rammed in up to the top of the form for the secondary hole, and another layer of bricks is placed around the middle third of the body shell.

A split collapsible wooden pattern for the furnace hole then is centered in place on top of the refractory cement, more of which is rammed in up to the top of the middle third of the shell.

The top third of the shell is lined with bricks, with about 1 in. left around the spout and charging door openings, and refractory cement is

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rammed into the top of the body shell. Wooden boards are used to keep the cement in shape around the spout and door openings. The split collapsible wooden patterns for the primary hole and the furnace hole are removed, and the spout is lined and shaped with cement.

The top steel shell, which contains two concentric steel rods and ribs for holding the refractory cement rammed into the top shell, next is placed on the body shell and bolted in place.

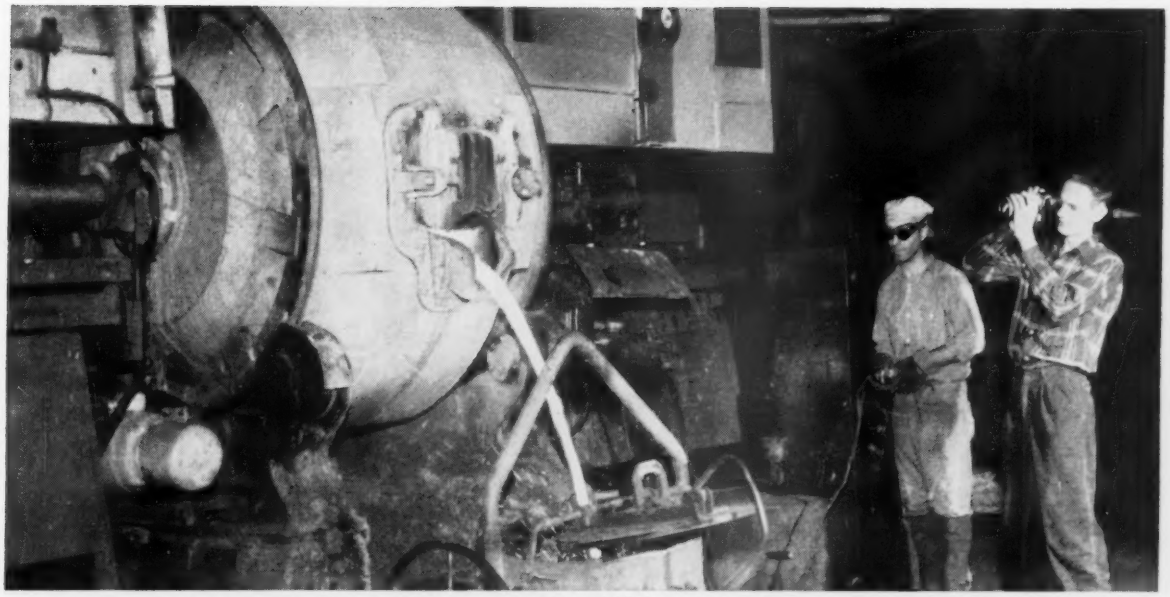
The entire furnace is allowed to air dry for one day and then is placed in an oven and dried at 400° F for a minimum of three days. After this drying, the primary coil and the silicon steel sheets are placed in the furnace. When needed, the furnace is picked up by a crane and placed on the furnace stand. Electrical connections are made and the furnace is ready for use. A blower attached directly behind the primary coil keeps the primary coil and core cool during melting operations.

Operations of the Furnaces—Alternating current of standard 60-c frequency is passed through the primary coil of the furnace. The magnetic field produced by the alternating current cuts across the molten metal in the secondary loop and induces current in the metal. Heat is generated by the induced currents in the metal in the secondary loop. Electromagnetic forces push the molten metal from the secondary loop into the furnace proper, and in this manner heat is transmitted to metal in the entire furnace and the molten metal is mixed thoroughly.

The amount of heat furnished to the molten metal depends on the voltage and frequency of the alternating current applied to the primary coil, the number of turns in the primary coil, the shape and size of the secondary channel and the resistivity of the metal being melted. The amount of heat applied in a low-frequency induction melting furnace is controlled by changing the voltage and maintaining all the other variables as constantly as possible. In melting iron in our furnaces, we use two voltages. We apply 440 v to the primary coil for melting (heating purposes) and 220 v for holding molten metal at constant temperature. At 440 v, 450 to 500 amp and 130 to 150 kw are supplied. At 220 v, 300 to 340 amp and 40 to 50 kw are supplied.

The procedure for melting iron is as follows:

The lining is heated for about a half hour with a gas torch to red heat (about 1000° F). Approximately 700 lb of molten iron from other fur-



A heat of alloy iron being poured from a 1500-lb. capacity Type AAH Detroit Electric Furnace in the Westinghouse foundry.

Nine Detroit ROCKING Electric Furnaces Melt Brass and Ductile Iron for Westinghouse Air Brake Co.

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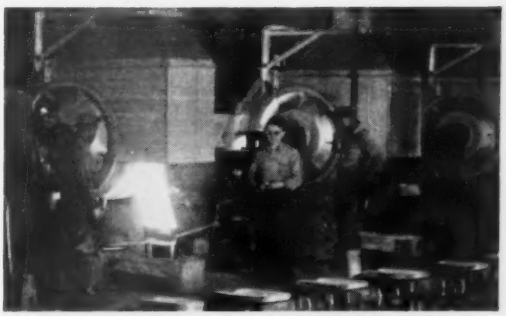
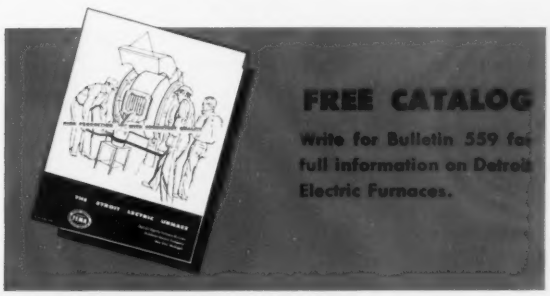
Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your melting requirements.



A battery of six 750-lb. capacity LFYH Detroit furnaces melt bronze of more than a dozen specifications.

A Westinghouse man records a heat of ductile iron melted in Type AAP Detroit Furnace with motorized electrodes.



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naces is poured into the unit. The molten iron flows through the secondary loop, melts the copper form and completes the secondary loop necessary for operation of the furnace. The switch for supplying 440 v to the primary coil is thrown, and actual melting operations are started.

About 900 lb of metal, composed 50 per cent by weight of pig iron—Class A (Federal Specification QQ-I-676a)—and 50 per cent of returned scrap is charged manually through the top. About 2 lb of ferrosilicon lumps (50 per cent silicon) is added per 100 lb of melt.

About 1½ hours is required to melt the charge and bring the temperature of the molten metal up to 2700° F for pouring. The temperature was measured originally with an optical pyrometer, but experience has shown that the proper temperature is reached when the dark, viscous slag on the surface of the melt becomes light yellow and fluid. The optical pyrometer now is used occasionally as a check.

Molten iron is poured into ladles with a manually operated wheel which tilts the furnace for pouring. About 400 lb is poured each time, at 20-minute intervals. If it is necessary to hold the molten iron at temperature, the voltage is cut back from 440 volts to 220 volts.

When the furnace is not operating over weekends and holidays, about 800 to 900 lb of molten metal is kept in it, and electric power is supplied at 220 v. Patching repairs are performed on the furnace at this time.

The furnace is operated continuously until relining is necessary. Then the power is shut off, the old furnace removed and a spare one set in its place. Two spare furnaces are available for use.

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An overhead track loop serves the pouring floor. Several molds can be poured simultaneously and empty ladles returned to the cupola and filled ones moved in without interference because of the diagonal cross-over tracks from one side of the loop to the other. ▶

SINCE 1948 Cleveland Tramrail equipment consisting of cranes and an extensive track and switch system has played an important role in speeding production, cutting costs and aiding safety in the foundry division of the Electron Corp., Denver, Colorado.

50 tons of ductile and gray iron are poured per day in this continuous high-production foundry. Pouring ladles of 1000 and 1200 lb. capacity deliver the hot metal from either of the two cupolas directly to the molds, thereby keeping handling to a minimum and reducing heat loss. The overhead track arrangement permits unhampered two-way travel of the Tramrail ladle carriers, thus enabling uninterrupted production. After these years of hard, full-production service, one feature of the Tramrail equipment for which there has become a growing awareness is the extremely small amount of maintenance required.

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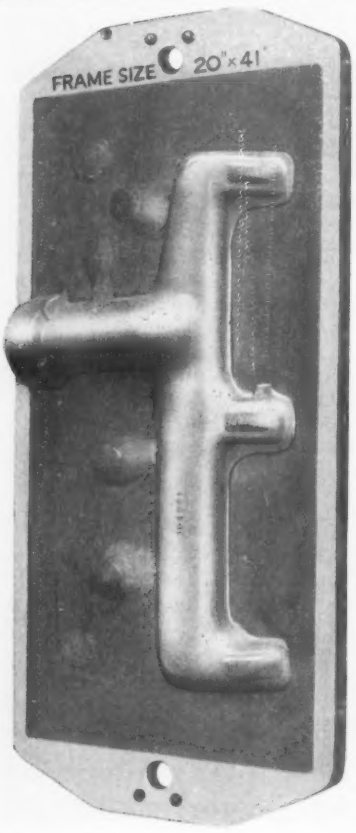

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these furnaces were used continuously to melt iron. At the present time, only one is being used for that purpose. Fig. 3 shows one of the furnaces during a melting operation. Each furnace has a separate instrument panel board which includes switches for turning electric power on and off and indicating instruments for measuring voltage, amperes and kilowatts. Five heats of cast iron, 1000 lb per heat, are made in a furnace in eight hours. Over a period of a week, including five melting days and two holding days, an average of 460 kwhr of electricity is consumed to melt 1 ton of iron in this furnace.

Type of Iron Produced—We have produced only one type of cast iron regularly in this induction furnace. The composition desired is C, 3.50 per cent; Si, 2.25 per cent; S, 0.12 per cent max; and P, 0.2 per cent.

To obtain this composition, a mixture of 50 per cent pig iron by weight and 50 per cent scrap is charged into the furnace. Pig iron used conforms to the requirements of Class A, Federal Specification QQ-I-676a, as noted earlier. A typical analysis of the pig iron by percentages is C, 3.78; Si, 2.86; S, 0.024; P, 0.607; and Mn, 0.67.

From July, 1947, to June, 1948, inclusive, the following range and average of analyses were obtained for cast iron melted in these furnaces: C, 2.20 to 3.70 (3.10 average); Si, 1.50 to 3.75 (2.67 average); S, 0.010 to 0.110 (0.057 average); P, 0.150 to 0.750 (0.406 average); and Mn, 0.24 to 0.97 (0.54 average).

In general, the castings are easy to machine, but occasional complaints are received. In these instances, it is found that the carbon content is low, mainly because of medium-carbon steel in the scrap iron charge. Another source of trouble is rust on the scrap charge, oxygen from which removes carbon from the iron melt. Precautions are taken to keep cast iron scrap carefully segregated from steel and not to use excessive amounts of rusted scrap in a charge. Fracture tests on castings made from iron produced in the low-frequency induction furnaces show a clean, homogeneous, fine-grained material.

We also have made several melts of upgraded irons and nodular irons in a low-frequency induction furnace. These irons were made, respectively, by the calcium carbide injection method, applied to the melt in the furnace, and by ladle additions of magnesium-bearing master alloys.

Acknowledgments

For their help in preparation of this article, acknowledgments are due to the personnel of the Naval Gun

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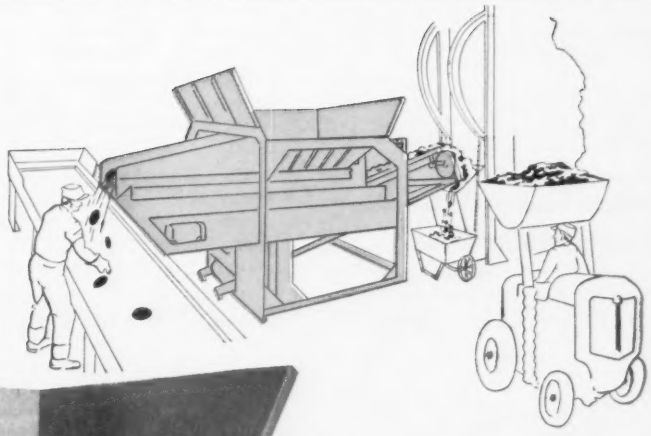
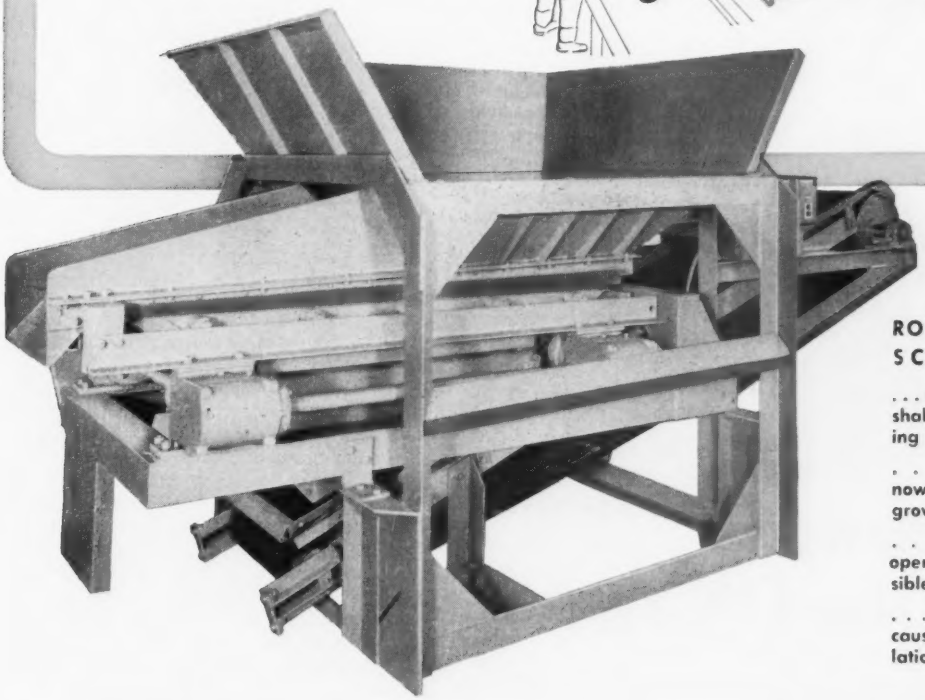
One Simple **MECHANIZED** Operation





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. . . eliminates hand labor in shake-out and sand cleaning

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Factory Foundry and Laboratory and to A. F. Shockey, production superintendent, Naval Gun Factory Manufacturing Department.

The contents of this article reflect the private opinions and assertions of the authors and are not to be construed as official or reflecting the views of the Navy Department or the Naval Establishments at large.

Hamilton Foundry & Machine Restores Familiar Figure

Charlie Woolley, a symbol of welcome in the Old South for generations, now is assured a lasting place in the world of hospitality. In cast iron form, Charlie was displayed at the exhibit of Hamilton Foundry & Machine Co., Hamilton, O., at the First Engineered Castings Show, held in conjunction with the AFS Castings Congress at Cincinnati, May 6-10.

The appearance of the life-sized statue of the grinning boy is a reminder of the feat achieved several years ago by engineers and patternmakers who restored Charlie.

Charlie Woolley was the name given to the cast cement figure by the Broadmoor Hotel, the Colorado Springs, Colo., resort. The statue dates back to Civil War days and was bought in 1930 from a New Orleans antique shop. Stationed at the door of the hotel's executive office,

it became a familiar fixture to visitors, but suffered several setbacks at the hands of college students out to celebrate football victories.

Eventually, the hotel management sought to restore its symbol of hospitality. Fragments of the statue were gathered up and shipped to Hamilton Foundry & Machine Co. Reconstruction of the pieces of broken cement was a long, arduous job. Pieces of wood, plastic wood, plaster and wax were used to reassemble the statue into a working pattern. Then Charlie Woolley came out in a 500-lb cast iron form, ready to greet Broadmoor vacationers again.

Sees More Metals Research at Armour Research Foundation

The volume of metallurgical research at Armour Research Foundation, Illinois Institute of Technology, will increase 42 per cent within the next five years. That prediction was made by Robert A. Lubker, manager of the ARF metals research department, at ground-breaking ceremonies for a $1.1 million addition to the Metals Research Building at the foundation.

Mr. Lubker estimated that metals research volume will grow from $1¾ million to $2½ million by 1962 and that the staff will increase from 155 to 225. During the last five years, it doubled. The foundation will expand its activities in the areas of composite materials, ferrous alloy development, processing of ferrous materials and the development of methods for studying fatigue properties at elevated temperatures.

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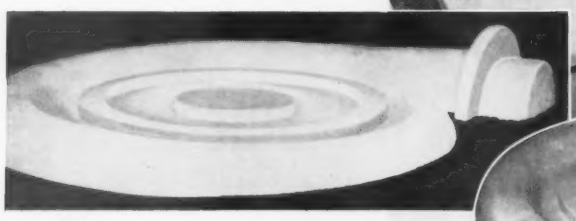
How To Make a Large

PLASTIC PATTERN

1



2

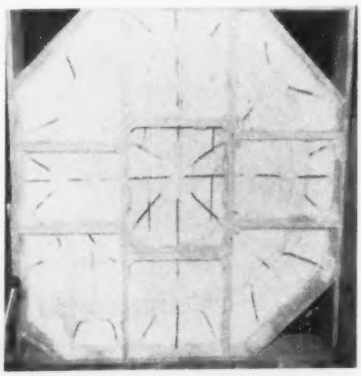
3

FOND du Lac Pattern Works, Milwaukee, recently made what is said to be one of the largest plastic patterns ever produced off a green sand mold. It is an all-plastic cope pattern for a centrifugal blower housing and was completed in less time than would have been required by conventional methods.

So that the original wood pattern could be kept in production, a sand mold, Fig. 1, was sent to the pattern shop. The mold was coated with a plaster release agent, then filled with plaster to produce the pattern shown in Fig. 2. The plaster pattern was sanded smooth and sprayed first with a sealer and then with a vinyl parting agent as shown in Fig. 3. The finished plaster pattern was placed on a cope board and a plywood frame built around the pattern. A laminated plastic mold reinforced with deformed rods was constructed over the pattern as shown in Fig. 4.

After the mold was lifted off the plaster pattern the cavity was lined with clay to a thickness of ¼-in. Lightener cores were suspended in the remaining cavity, leaving a uniform space of 1½ in. A newly developed epoxy resin was poured into that space to serve as a back-up material for the finished pattern. The back-up and clay were removed from the mold, the clay discarded, and the back-up placed back in the mold cavity, leaving a ¼-in. space between it and the mold surface. An epoxy casting resin of different formulation was poured into the space to form the surface of the finished pattern. Fig. 5 shows the plastic pattern after removal from the laminated mold in the background, and Fig. 6 shows the completed plastic cope equipment mounted on the cope board.

Plastics used in constructing the pattern are a product of Kish Industries Inc., Lansing, Mich.



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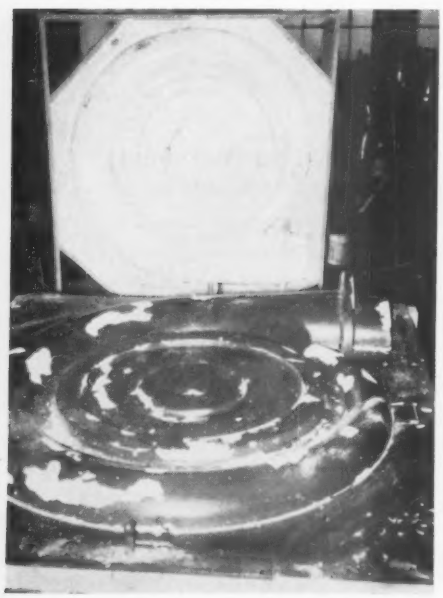

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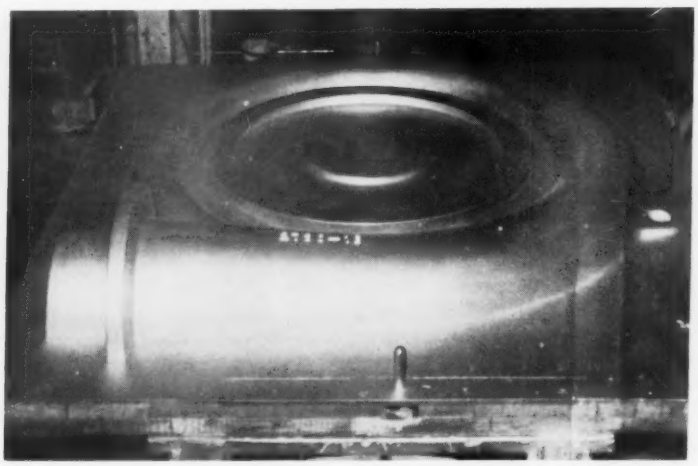

6

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Foundry Group Meetings

Gray Iron Founders' Society Meets in Chicago, Oct. 9-11

The Gray Iron Founders' Society, Cleveland, will hold its 29th annual meeting at the Drake Hotel, Chicago, Oct. 9-11. Highlights of the three-day meeting will be addresses by J. Lewis Powell, Office of Assistant Secretary of Defense, Washington; Roy A. Foulke, vice president, Dun & Bradstreet Inc., New York; and Chester V. Nass, vice president, Beardsley & Piper, Div. Pettibone Mulliken Corp., Chicago, and president, Foundry Educational Foundation.

A "buzz session" on the industry's terms and conditions of sale is scheduled for Thursday afternoon and will be followed by a talk by Charles F. Walton, GIFS technical director, on "The Basic Elements of Cast Iron Microstructure." On Friday, Harold Brown, sales manager, Hunt-Spiller Corp., Boston, will speak on "Developing Sales and Salesmen."

Recreational and social activities have been arranged for the foundrymen and their wives.

Wednesday, Oct. 9

9:45 a.m.—Meeting of retiring and new board of directors.
12:30 p.m.—Luncheon, board of directors.
6:30 p.m.—President's reception.
7:30 p.m.—Banquet.

Thursday, Oct. 10

8:30 a.m.—Registration.
9:30 a.m.—Business session, President J. Scott Parrish Jr., presiding. Reports by GIFS officers and staff.
10:45 a.m.—Presentation of printed annual reports of GIFS standing committees. Brief remarks by committee chairmen.
11:15 a.m.—**The Big Difference,** a sales promotional film produced by Superior Steel & Malleable Castings Co., Benton Harbor, Mich.
12:30 p.m.—Industry luncheon. Speaker: J. Lewis Powell, Office of Assistant Secretary of Defense, the Pentagon. Subject: **What Mobilization Would Mean to You.**
2 p.m.—Business session: **Gray Iron Terms and Conditions of Sale,** moderators, Peter E. Rentschler, president, Hamilton Foundry & Machine Co., and Curtis C. Williams Jr., GIFS legal counsel and partner, Jones, Day, Cockley & Reavis.
4 p.m.—**The Basic Elements of Cast Iron Microstructure,** C. F. Walton, technical director, GIFS.
7:30 p.m.—Industry banquet and entertainment.

Friday, Oct. 11

8:30 a.m.—Registration.
9:30 a.m.—Business session.
9:45 a.m.—**Developing Sales and Salesmen,** Harold Brown, Hunt-Spiller Mfg. Corp., Boston.
10:30 a.m.—**Engineering Cost Reductions,** Chester V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, and president, FEF.
11:15 a.m.—**Ratios Can Get You,** Roy A Foulke, Dun & Bradstreet Inc., New York.
1 p.m.—Industry luncheon. Introduction of new officers and directors. Presentation of winners, 1957 Design Contest, and 1957 citations and awards.

Steel Founders To Meet at Hot Springs, Sept. 23-24

The 55th annual fall meeting of the Steel Founders' Society of America will be held on Monday and Tuesday, Sept. 23-24, at the Homestead, Hot Springs, Va. Howard F. Park Jr., vice president sales, General Steel Castings Co., Granite City, Ill., president of the society, will preside at all sessions.

Featured events on the program include speakers James M. Dawson, vice president and economist, National City Bank of Cleveland, Joseph F. Leopold of Dallas, Tex., and Colin Carmichael, editor, MACHINE DESIGN, Cleveland.

MISSOURI VALLEY CONFERENCE: Shown here is a view of part of the campus of the Missouri School of Mines & Metallurgy, Rolla, Mo., including Parker Hall, site of the 1957 Missouri Valley Regional Foundry Conference. Henry C. Deterding, Sonken-Galamba Corp., is general chairman of the conference, assisted by members of all four participating chapters. For the complete program of the Missouri Valley meeting, see Page 187, August FOUNDRY

R. B. COTTRELL

COLIN CARMICHAEL

"The Way to Market Expansion" is the topic of the Monday, Sept. 23 session. President Park will review the activities of the society in the fields of market expansion and product development in his opening remarks. Mr. Dawson's topic, "A Crystal Ball Look at Business," will cover forecasting from the financial viewpoint.

E. T. VINCENT

C. S. ROBERTS

Colin Carmichael, chairman of the judges committee for the Steel Founders' third product development contest, will preface the actual awards with a review of the winning entries and their portent to the future markets of steel castings. Other members of the committee are Robert B. Cottrell, Belleville, Ill.; Chester S. Roberts, Philadelphia, and Edward T. Vincent, chairman of the Department of Mechanical Engineering, University of Michigan.

National cash awards of $1000, $750, $400, $200 and $100 plus certificates will be presented in each of two classes by Mr. Carmichael, President Park and Roy A. Gezelius, assistant vice president, General Steel Castings Corp., Eddystone, Pa., chairman of the society's Product & Market Development Committee, which sponsors the contest. Announcement of other awards will be made immediately following this presentation.

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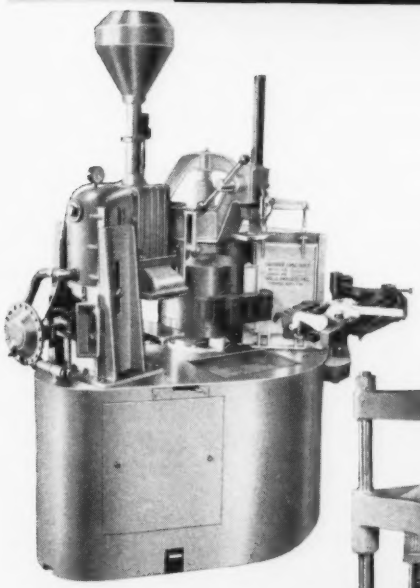
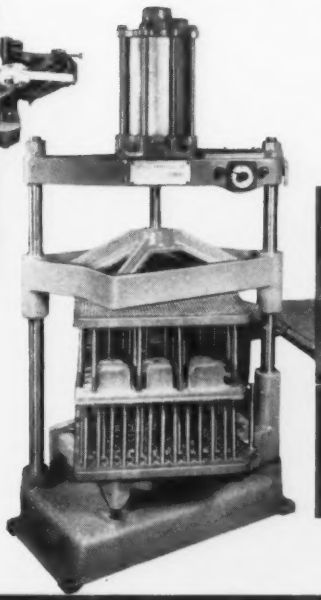


SHELL CORE BLOWER — Dual core box machine. Handles any type core box.



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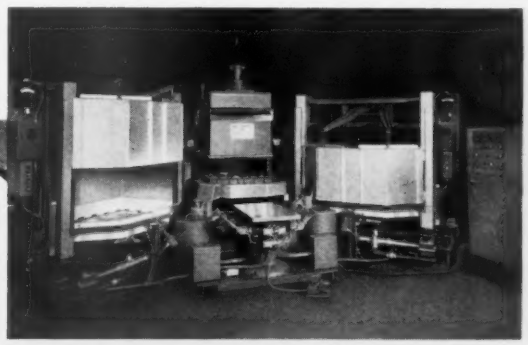

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Managerial problems will be discussed at the Tuesday session, with Mr. Leopold as the featured speaker on the subject of "Your Competitor—Uncle Sam." Chauncey Belknap, Patterson, Belknap & Webb, New York, legal counsel for the society, will open the meeting. E. C. Huebner, personnel manager, Wehr Steel Co., Milwaukee, chairman of the society's Safety Committee will speak on "Safety in the Industry" as an introduction to the presentation of the safety contest awards.

Other events include a program of entertainment for ladies, a men's golf tournament, and a banquet on Monday evening.

New England Conference To Be Held at MIT, Oct. 18-19

The 17th New England Regional Foundry Conference will be held Oct. 18-19 at Kresge Auditorium, Massachusetts Institute of Technology, Cambridge, Mass. General chairman of the conference is Albert M. Nutter, E. L. LeBaron Foundry Co., Brockton, Mass. Vice chairman is Clyde Armstrong, Warren Foundry & Pipe Division, Shahmoon Industries Inc., Everett, Mass.

Chairmen for the ferrous program are Kenneth McGrath, Hunt-Spiller Corp., Boston, and Paul Mongeau, Joy Mfg. Co., Claremont, N. H. Chairmen for the nonferrous program are Walter Helmedach, Wilcox-Crittenden Division, North & Judd Mfg. Co., Middletown, Conn., and Frank Tibbetts, Wollaston Brass & Aluminum Foundry, Wollaston, Mass.

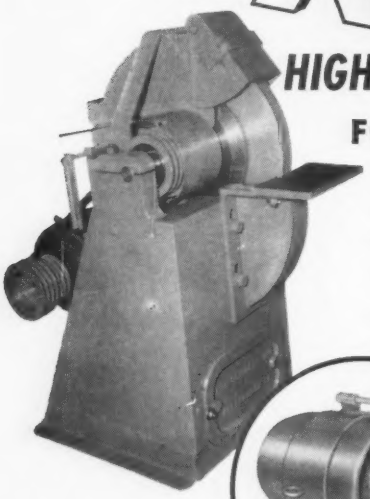
Prominent speakers will present papers at four ferrous and four nonferrous sessions, covering topics such as epoxy resins, casting design, various coremaking processes, waterless sand, metal injection, limited mechanization, material handling, and treatment of nonferrous metals. Three general sessions will be held discussing the future of foundries in New England, foundry management, and marketing.

A conference dinner will be held on Friday evening at the MIT Faculty Club, and the annual foundrymen's smoker will be held Saturday evening at the Parker House Roof in Boston.

Detailed program of conference events will be published as soon as it becomes available.

FOX

HIGH-SPEED STAND GRINDERS



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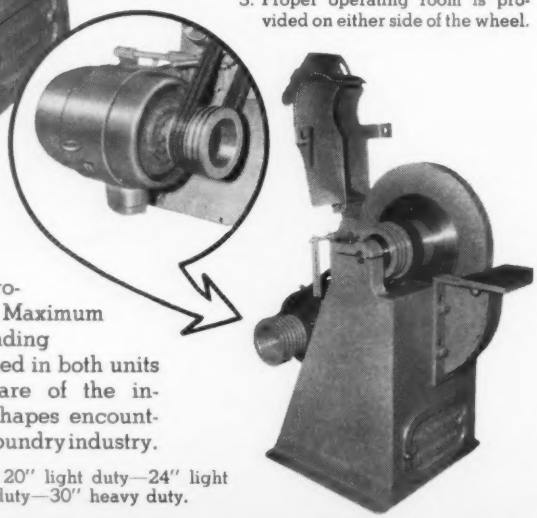

These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty—30" heavy duty.

FOX GRINDERS, Inc.

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Michigan Regional Conference To Be Held at Michigan State

Arrangements and program for the 1957 annual Michigan Regional Foundry Conference have been completed. The meeting will be held at Kellogg Center, Michigan State University, East Lansing, Mich., under sponsorship of that school, University of Michigan and Michigan chapters of the AFS. Conference chairman is R. B. Kropf, International Nickel Co., Detroit, with W. E. Truckenmiller, Albion Malleable Iron Co., Albion, Mich., vice chairman. Jerome R. Young, Cadillac Motor Car division, GMC, Detroit, is conference secretary; C. C. Sigerfoos, Michigan State University is conference treasurer; and Jess Toth, Harry W. Dietert Co., Detroit, is permanent executive secretary-treasurer.

Program for the conference follows:

Wednesday, Oct. 2

9 a.m.—Registration

9:45 a.m.—Opening session: "Welcome to MSU," Dean John D. Ryder, School of Engineering, Michigan State University.

10 a.m.—Technical session: **Cores—CO, Process,** C. Meyer, Central Foundry Division, GMC, Saginaw, Mich. **Gas'fied Process,** Speaker to be announced. **Core Shooting,** Robert Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich. Question and Answer period. W. C. Truckenmiller, Albion Malleable Iron Co., Albion, Mich., chairman.

12:30 p.m.—Luncheon: **Creative Management,** Dr. Harold Sylvester, Michigan State University. **Progress in Foundry Training,** Harry W. Dietert, Harry W. Dietert Co., Detroit, and President, American Foundry-

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men's Society. Dr. R. A. Flinn, University of Michigan, toastmaster.

2:30 p.m.—Technical session: **Preventive Maintenance—Air,** M. L. Williamson, Chevrolet-Saginaw Gray Iron Foundry Division, GMC, Saginaw, Mich. **Belting,** James Stewart, Chrysler Corp., Detroit. **Bearings** and **Electrical Equipment,** Speakers to be announced. Panel Discussion. F. H. Hutchins, Engineering Castings Inc., Marshall, Mich., chairman.

6:30 p.m.—Dinner: Speaker, Forddy Anderson, Michigan State University. **Comments from National Headquarters,** William W. Maloney, American Foundrymen's Society. Student Award Presentations, Henry LaForet, Pontiac Motor Division, GMC, Pontiac, Mich., and chairman, Student Activities Committee. Robert Dodge, Archer-Daniels-Midland Co., Detroit, toastmaster.

Thursday, Oct. 3

9 a.m.—Registration

10 a.m.—Technical session: **Quality Control-Scrap Reduction—Nonferrous,** Robert Cope, Rapid Cast Corp., Grand Rapids, Mich. **Steel,** W. T. Shute, West Michigan Steel Foundry Co., Muskegon, Mich. **Gray and Malleable Iron,** E. C. Bumke, Campbell-Wyant-Cannon Foundry Co., Muskegon, Mich. Panel Discussion. David Jacobsen, Grand Haven Brass Foundry, Grand Haven, Mich., chairman.

11:15 a.m.—**Gamma Radiography,** D. M. Murray, Albion Malleable Iron Co., Albion, Mich.

12:30 p.m. — Luncheon: Speaker, Brendan Sexton, educational director, CIO. Dr. Austen Smith, Michigan State University, toastmaster.

2:30 p.m.—Technical session: **Shell Molding Developments at Ford Motor Co.,** Dearborn, Mich., Harold C. Grant. Panel Discussion: Mr. Grant; Ralph W. Gardner; Arthur Adams; Walter Blyler; George Beals, all of Ford Motor Co., Dearborn, Mich. Arthur Adams, chairman.

6:30 p.m.—Banquet: Speaker, Dr. Carl Winters. Horace Dean, Campbell-Wyant-Cannon Foundry Co., Muskegon, Mich., toastmaster.

Sessions on Castings Are Set For Fall Meeting of ASME

Five sessions dealing with castings will be sponsored by the American Society of Mechanical Engineers at its 1957 fall meeting in Hartford, Conn., Sept. 23-25. Written with the interests of the mechanical engineer in mind, the 15 papers to be presented deal with subjects ranging from magnesium castings to the elevated temperature properties of alloy steel castings.

These sessions will begin on Tuesday, Sept. 24, and run through Wednesday afternoon, Sept. 25. Efforts are being made to publish a compilation of the papers so that they will be readily available to interested design engineers. The meeting will be held at the Hotel Statler.

Chicago: For this year's annual stag outing and golf on Aug. 10, the Chicago Chapter of AFS went to Nordic Hills Country Club, near Itasca, Ill. Following the practice initiated in 1956, participation was limited principally to members. Attendance approximated 400 and ideal summer weather prevailed.

Something of a sensation occurred in golf when a guest, Wilbur H. Overman, Ingalls-Shepard Division, Wyman-Gordon Co., manufacturer of drop forgings, Harvey, Ill., made a hole-in-one on the 88-yd 13th hole. It was the second such achievement

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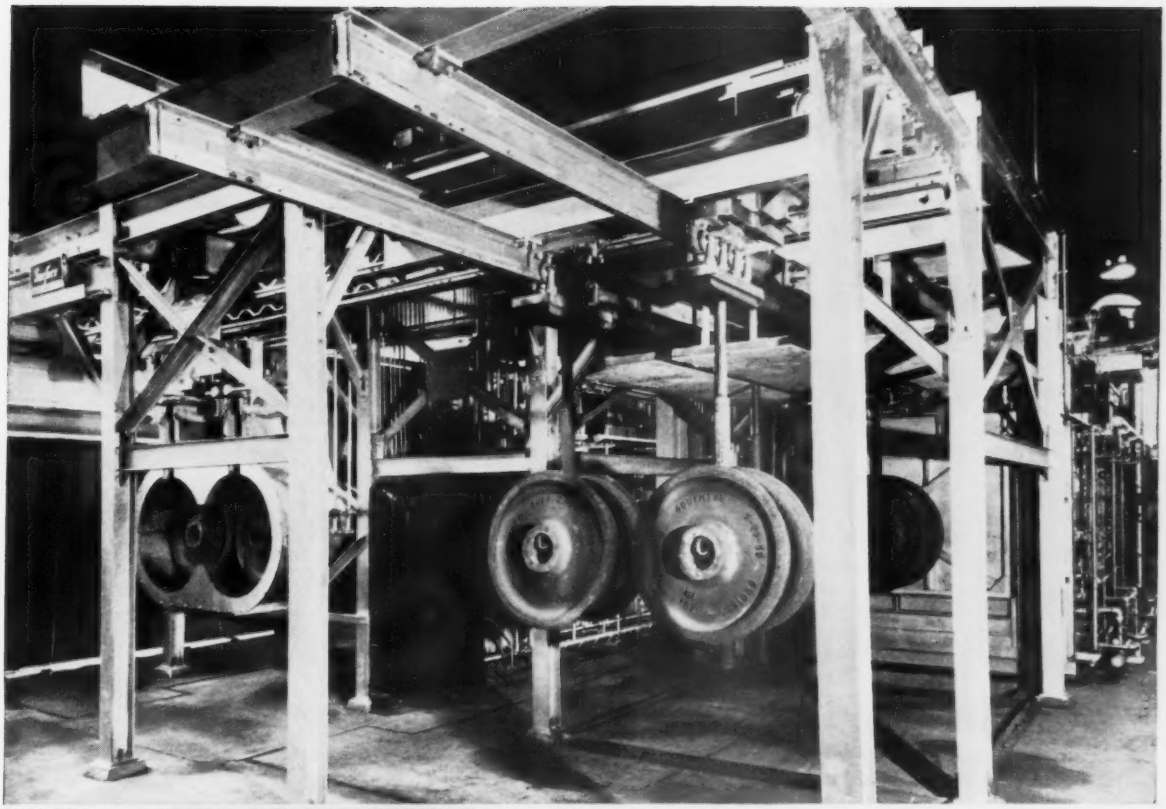

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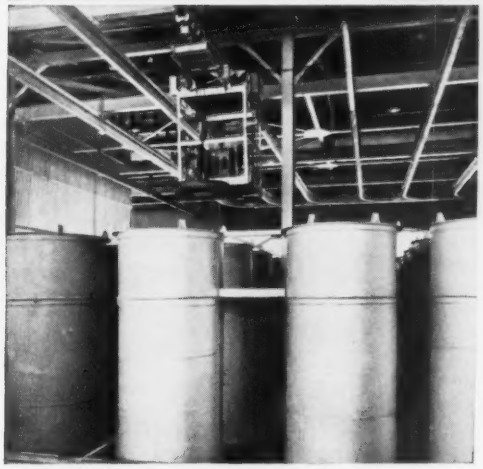

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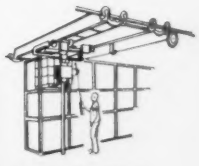
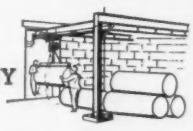


STACKER CRANE



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Get this *free* catalog

Catalog contains complete details on all types of Brinell Hardness Testers . . . for laboratory, or production: Dead Weight, Hydraulic, Hand or Motor Operated, Large or Small, Standard and Special.

Since 1914

Sales Offices in all metalworking areas.

Steel City Testing Machines Inc

8801 Lyndon Ave., Detroit 38, Mich.

Mail this coupon for above Brinell Catalog. Check interest below on other types of testing machines.

Ductility ☐

Tensile ☐

Compression ☐

Transverse ☐

Hydrostatic ☐

Proving Rings ☐

Flex-Tester ☐

NAME_____

ADDRESS_____

Attach coupon to your letterhead and mail.

Circle 744 on Inquiry Card—Page 51

for Mr. Overman, and a real thrill.

Winners in horseshoe pitching were John Briggs and James Anderson, Lindgren Foundry Co. In the annual weight guessing contest, Earl Nelson, Crane Co., took the honors with his estimate of 54 lbs 5 oz, a figure which was only 5 oz under the actual weight.

The outing was arranged and directed by the chapter's entertainment committee, of which John C. Mulholland, Pettibone Mulliken Corp., is chairman. Members of the committee included Roy C. Nelsen, Sterling Wheelbarrow Co.; Herbert C. Aamodt, Great Lakes Carbon Corp.; Robert P. Schauss, Werner G. Smith Inc.; Jay S. Groh, Manley Sand Co.; Leroy Taylor, Ottawa Silica Sand Co.; George Bowdish, Hill & Griffith Co.; John Brandt, Milwaukee Chaplet Co.; A. A. Milkie, Pangborn Corp.; Robert W. Meloy, Link-Belt Co.; and Richard M. Frazier, Hickman, Williams & Co.—*Erle F. Ross.*

Magnesium Association Plans 13th Annual Convention

"Magnesium In Perspective" has been announced as the theme of the 13th annual convention of the Magnesium Association to be held at the Biltmore, New York, Oct. 17-18.

Papers to be presented will concentrate on a review of the major present areas of use for magnesium plus a projection of new uses and applications indicated in current research and experiment with available and experimental magnesium alloys.

Top engineering personnel of missile and aircraft contractors will share the platform with their counterparts from the electronics and equipment industries. Preliminary copies of the program show that Convair, Chance-Vought, Dalmo-Victor, Raytheon, Bell Laboratories, Dow, McDonnell and Turco Products are among the nationally-known companies to be represented on the speaker's platform.

AFS Offers 1957 *Transactions*

The 1957 edition of the *Transactions* of the American Foundrymen's Society will be available for shipment early in December. It will contain all of the approximately 90 papers presented at the 1957 convention in Cincinnati and will include the discussions which followed presentation of the papers. Other material pertaining to society activities also will be in the volume. Copies may be ordered at $10 each from AFS, Golf & Wolf Rds., Des Plaines, Ill.

GET CLEANER CASTINGS with DU-CO *High Temperature Ceramic*

STRAINER CORES
REFRACTORY TUBING
SPECIAL SKIMMER CORES
POURING SPOUTS

The fusion point of this high temperature refractory material is 3056°, safely above the pouring temperature of metals. We have a wide variety on hand, or can make to order. Ask for samples and quotations.

DU-CO CERAMICS CO.
BUTLER 10, PA.

Circle 745 on Inquiry Card—Page 51

this is the DYNAMIC FOUNDRY INDUSTRY...

Value of foundry industry production is at an all time high of over $6½ billion, as shown in the table below. Because of its end-product system of classifying plants, the U.S. government includes in its foundry SIC groups only the "jobbing" foundries—the 3,650 plants which produce castings for resale. However, the dynamic foundry industry is bigger than SIC figures indicate. It also embraces the 2,000 "captive" foundries operated by companies that make castings for their own use. The annual buying power of *all* castings producers, both jobbing and captive foundries, exceeds 2½ billion dollars for equipment, materials and supplies. Industry figures presented here are based on the 1954 Census of Manufacturers, and estimates by Sales Management and FOUNDRY's market research department.

SIC Code	Industry Title	Value Of Products Shipped		Employment	
		1954	1956	1954	1956
3321	Gray iron foundries (jobbing)	$1,419,000,000	$1,810,000,000	133,900	150,000
	Gray iron foundries (captive)	1,167,000,000	1,339,000,000	74,400	80,400
	Total-Gray Iron foundries	**2,586,000,000**	**3,149,000,000**	**208,300**	**230,400**
3322	Malleable foundries (jobbing)	212,000,000	265,000,000	23,400	27,100
	Malleable foundries (captive)	169,000,000	187,000,000	12,200	13,100
	Total-Malleable foundries	**381,000,000**	**452,000,000**	**35,600**	**40,200**
3323	Steel foundries (jobbing)	535,000,000	925,000,000	55,100	70,000
	Steel foundries (captive)	186,000,000	257,000,000	15,300	21,000
	Total-Steel foundries	**721,000,000**	**1,182,000,000**	**70,400**	**91,000**
3361	Nonferrous foundries (jobbing)	874,000,000	1,127,000,000	73,500	83,800
	Nonferrous foundries (captive)	560,000,000	681,000,000	39,600	47,400
	Total-Nonferrous foundries	**1,434,000,000**	**1,808,000,000**	**113,100**	**131,200**
FOUNDRY INDUSTRY TOTAL		**$5,122,000,000**	**$6,591,000,000**	**427,400**	**492,800**

How FOUNDRY can help you get more business from the rich, growing metal-casting market

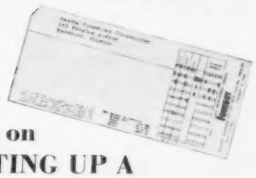
1 Help on ANALYZING THE MARKET

Tells you where *every* foundry in the U. S. and Canada is located . . . describes each one in detail. Revised every two years, Penton's Foundry List keeps you up-to-date on *changes* that take place . . . helps you know who and where to sell. Available at moderate cost.

2 Help on EVALUATING PERFORMANCE AND POTENTIALS

A "Foundry Industry MARKETING GUIDE" identifies the 96 primary trading areas ranked by productive capacity. Permits a quick, accurate check of your sales performance and potentials by territories . . . pinpoints market potentials.

3 Help on SETTING UP A SALES CONTROL PLAN

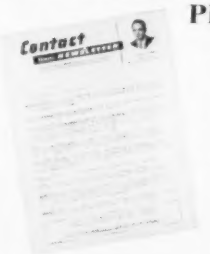


Sales Control Cards tailor-made to your sales and territory requirements give your salesmen "blue ribbon" prospect lists. Essential information is coded on punch cards for your use in direct mail, sales analysis, personal selling. Available at moderate cost.

4 Help on MAKING YOUR DISTRIBUTION MORE EFFECTIVE

A system for improving or starting an effective distribution setup to cover the foundry industry. This list of supply houses and agents gives locations and necessary information . . . classified advertising in FOUNDRY often backs up this service.

5 Help on PROMOTION AND MERCHANDISING PROGRAMS



Advertising in FOUNDRY is backed, on request, by a complete merchandising program including ad and editorial reprints, a regular newsletter "CONTACT", even personal letters to kick off a campaign. It is aimed at your customers and prospects as well as your own salesmen and distributors, should you wish to use this service.

. . . and you do more business with foundries when you advertise in . . .

FOUNDRY

NDP BPA

a PENTON *Publication / Penton Building • Cleveland 13, Ohio*

The Shakeout

Foundry Equipment Mixes Ore Concentrates

FOUNDRY EQUIPMENT manufactured by Pekay Machine & Engineering Co., Chicago, now is being used to mix ore concentrates. After one year of continuous testing, 24 special mixing and mulling units are being made for the Erie Mining Co., a subsidiary of Bethlehem Steel Co., for its commercial taconite plant at Hoyt, Minn.

These units will mix bentonite and sea coal with taconite continuously on a 30-in. wide belt conveyor before the mix goes to the balling mill. Taconite concentrate is twice as heavy, four times as tacky and eight times as abrasive as foundry sand.

For More Details Circle No. 485—Page 212

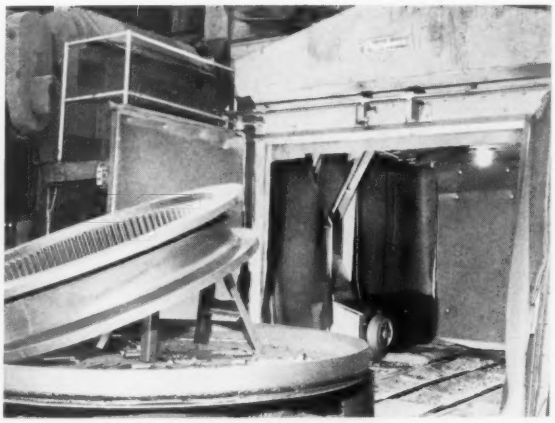
Expansion Program Includes New Laboratory

AS PART of an over-all expansion of facilities, Valvair Corp., Akron, Ohio, has completed a new product development and testing laboratory. Fully equipped with the

latest testing and measuring devices, the new laboratory provides means for determining dynamic characteristics of all types of valves and for establishing the engineering soundness of new designs. Much of the new equipment was designed, developed and custom assembled by or for Valvair. Photographic facilities permit permanent recording of test patterns, as shown here.

Rubber Sheeting Lines Shot Blast Room

A REDUCTION in down time and material costs resulted when Minneapolis Electric Steel Castings Co., Minneapolis, lined the walls of its shot blast room with a specially compounded rubber sheeting called Karbonite. Annual savings in material alone have come to $2196, and down time and maintenance labor have been cut in half. The rubber lining is reported to outlast steel by more than three to one, with an average life of about six months.



The cleaning room is 14 x 10 x 7½ ft, and it uses 488 sq ft of ½ in. rubber sheeting (48 in. wide) as a liner. Castings are wheeled into the room on a railed cart on which they rotate under firing from steel pellets at velocities up to 250 fps. About 15,000 lb of shot are hurled at the castings by three belted wheels during the 20 to 30-minute cleaning time. Use of the rubber was suggested by the supplier, W. S. Nott Co., Minneapolis. It is a product of New York Belting & Packing Co.

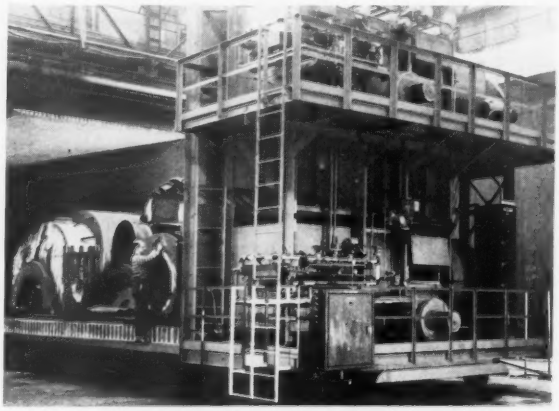
For More Details Circle No. 486—Page 212

Car-Bottom Furnace Anneals Huge Castings

A CAR-BOTTOM FURNACE, believed to be one of the largest of its kind ever built, is used to stress relieve huge castings at the Schenectady, N. Y., plant of General Electric Co.

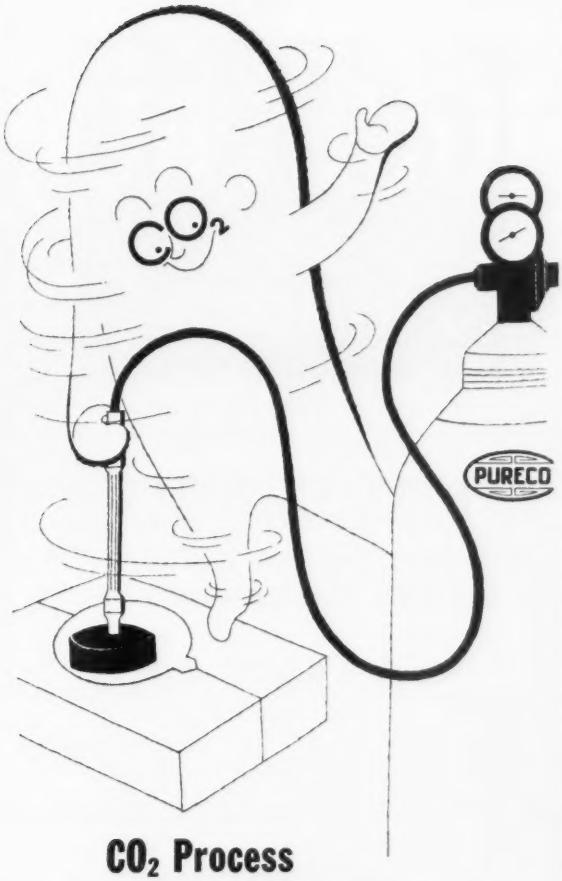
The giant unit was designed and built by the company's Industrial Heating Department and is used for stress relief annealing of large castings at GE's Large Motor and Generator Dept. Total maximum heat input to the gas-fired furnace is 10 million Btu per hour, and maximum operating temperature is 750°C.

Although the unit carries a nominal rating of 100



tons, it has processed actual loads as high as 150 tons. Maximum load dimensions are as follows: Length, 30 ft; width, 18 ft; and height, 16 ft. The car weighs 100 tons unloaded and is driven by a 5-hp motor through a fluid drive.

For More Details Circle No. 487—Page 212



CO_2 Process cures molds and cores in seconds—without baking—Equipment Cost: Less than $100!

Pureco can tailor a CO_2 installation to meet your specific foundry requirements–whether they be large or small.

Call your nearest Pureco office for information regarding a complete line of CO_2 equipment and CO_2 supply systems–cylinders, cylinder banks, converters, receivers–all described in Bulletin #27. Write for your copy.

Remember–Pureco Technical Sales Service is anxious to serve you.

PURECO CO_2

Pure Carbonic Company

A Division of Air Reduction Company, Incorporated
150 EAST 42nd STREET, NEW YORK 17, N. Y.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Circle 746 on Inquiry Card—Page 51

ONE OF THE LARGEST EVER BUILT...

DIMENSIONS:
90" x 103"
Cope 42"
Drag 36"

by American... OF COURSE

*formerly a division of Black, Sivalls & Bryson

Specially designed for a large eastern foundry, this heavy duty flask is one example of the close co-operation between our experienced engineering department and our customer-foundry.

The heavy duty flask shown above has ½" walls, special heavy bearings and reinforcements and lifting loops and brackets. Cutouts for core installations are heavily reinforced.

We'll be glad to place our flask engineering and designing experience at your complete disposal and make quotations on your flask requirements.

Write us or our representative today.

affco **AMERICAN FOUNDRY FLASK CO.**

2745 SOUTHWEST BLVD., KANSAS CITY, MO.

Circle 747 on Inquiry Card—Page 51

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For
CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

American Gum Products Co.
(Established 1915)

GENERAL OFFICES AND PLANT: • ERIE, PA.

Circle 748 on Inquiry Card—Page 51

"Put it where you want it, while you watch it!"

with this Push-Button, Floor Controlled
EUCLID CRANE
AT WORK IN A LARGE AUTOMOTIVE FOUNDRY

Foundry cranes fall into a class by themselves as we see it.

Abrasive and corrosive atmospheric conditions that prevail in foundries make dirt and dust proof mechanisms imperative. Precision load control with trouble-free operations for long periods of service are requisite.

These and many other valued features are common to Euclid Foundry Cranes.

Push-button and rope pendent floor controls as well as overhead cab operation is available.

Euclid Cranes carry their share of the production load every day in foundries all over the world.

We can build any foundry crane you require.

A phone call or letter will put our services at your disposal.

Write for our Catalog on Cranes and Hoists.

EUCLID HOISTS
for Dependable Service
2000 to 40,000 lbs. Capacities

THE EUCLID CRANE & HOIST COMPANY
1360 CHARDON ROAD
CLEVELAND 17, OHIO

Circle 749 on Inquiry Card—Page 51

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.

ORWELL, OHIO • U. S. A.

SALES • SERVICE • STOCK • COAST TO COAST

Circle 750 on Inquiry Card—Page 51

Are You Looking

or

Machineability?

Chemical inertness?

High thermal conductivity?

High temperature stability?

Resistance to thermal shock?

. . . then consider GRAPHITE — it has many unique qualities.

We are specialists in graphite specialties. Our technicians will be glad to work with yours.

ELECTRODE GLC DIVISION

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N.Y.

Circle 751 on Inquiry Card—Page 51

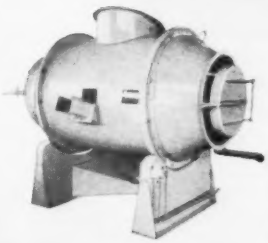
STROMAN

FURNACES For IRON or BRASS

Here are two exceptional Stroman Furnaces that will give you better melts, better castings and cut costs to the bone. Designed by the leading metallurgical engineers they will do their jobs more efficiently, faster and economically than old fashioned equipment. To compete in the foundry market you must modernize . . . and Stroman Foundry Equipment is the most modern and best you can buy.

INVESTIGATE THEM TODAY!

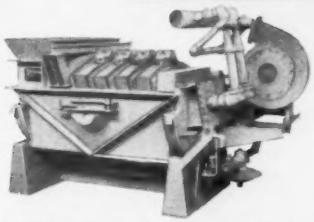
IRON MELTING



STROMAN TYPE "R.F." BARREL FURNACE

This open flame, barrel type furnace with burners firing tangent to the inside of the lining is designed to produce an ideal combustion arrangement for very tast melting of iron. It is applicable to jobbing gray iron foundries for its speedy melting cuts labor and fuel costs. It is easily charged. Capacities up to 20,000 lbs. iron.

BRASS MELTING



STROMAN TYPE "JC" CRADLE TYPE TILTING FURNACES

For melting COPPER BASE ALLOYS of low zinc content (not exceeding 7% zinc) these furnaces are the most economical available. Their rapid melting time, from 15 minutes up depending on the size of furnace assures lowest fuel consumption and as always in a Stroman Furnace maintenance is at a minimum. Operators are not exposed to excessive heat making excellent working conditions. They are recommended for production work. Capacities range from 400 pounds up to 20,000 pounds per heat.

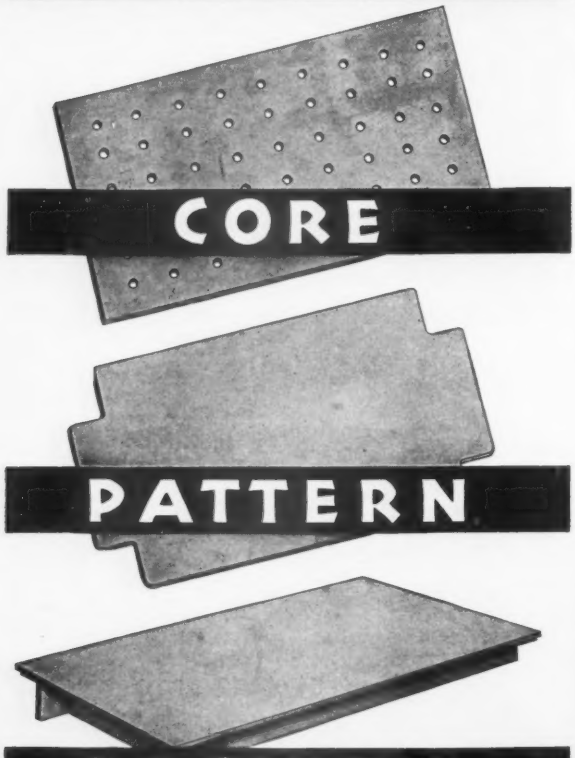
Stroman makes all types of furnaces for the melting of brass, bronze, aluminum, iron, magnesium and all other non-ferrous metals. Write for new bulletin #150 describing Stromans complete line including metal handling and conveyor equipment.

STROMAN FURNACE AND ENGINEERING CO.

FRANKLIN PARK, ILLINOIS

Circle 752 on Inquiry Card—Page 51

MOLTRUP



CORE

PATTERN

& BOTTOM

PLATES

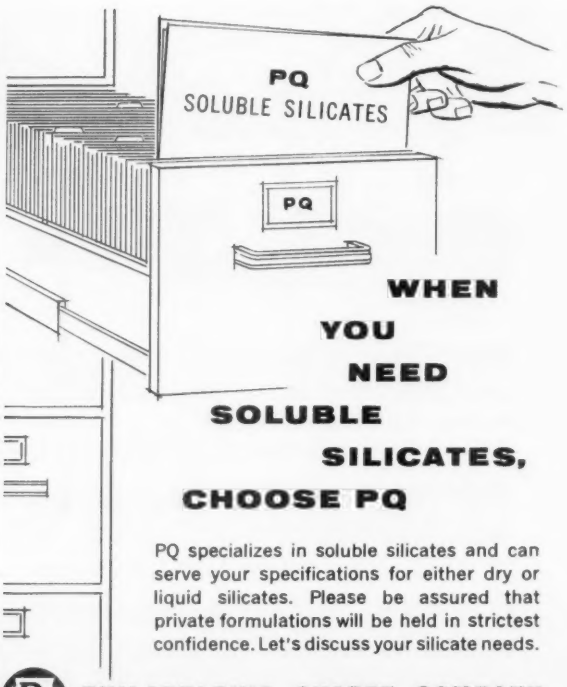
for accurate casting results specify Moltrup Plates! They *stay flat* and *last longer* than other types—for Moltrup employs a special flattening process designed to permanently eliminate buckling or bending.

Consequently your investment goes further and that *all-important profit-margin* increases. Plates are made to your specifications—we welcome the opportunity to furnish complete information.

MOLTRUP STEEL PRODUCTS COMPANY
BEAVER FALLS, PA. (Pittsburgh District)
Sales Offices in All Principal Cities

MOLTRUP

Circle 753 on Inquiry Card—Page 51



WHEN YOU NEED SOLUBLE SILICATES, CHOOSE PQ

PQ specializes in soluble silicates and can serve your specifications for either dry or liquid silicates. Please be assured that private formulations will be held in strictest confidence. Let's discuss your silicate needs.

PHILADELPHIA QUARTZ COMPANY
1062 Public Ledger Building, Philadelphia 6, Pa.
DISTRIBUTORS IN OVER 65 CITIES TRADEMARK REG. U.S. PAT. OFF.

PQ SOLUBLE SILICATES

PQ WORKS: ANDERSON, IND.; BALTIMORE, MD.; BUFFALO, N.Y.; JEFFERSONVILLE, IND.; CHESTER, PA.; KANSAS CITY, KANSAS; RAHWAY, N.J.; ST. LOUIS, MO.; UTICA, ILL.

Circle 754 on Inquiry Card—Page 51

OLIVER Double Arbor Saw

Bench rips, cross-cuts, miters patterns quickly!

Adjusted in a jiffy to each operation . . . saves time and cuts costs

This double-duty Saw Bench saves pattern shops valuable time. A shaftless motor is built directly on each of the two saw arbors. Either rip saw or cross-cut saw can be brought into action by turning the handwheel. Saw arbor tilts up to 45°. Arbors can be adjusted vertically. Rips up to 24¼" wide, cross-cuts up to 36" wide. A 16-inch saw projects 3¼" through table. Dadoes up to 4" wide. Cuts a perfect miter. Has most complete and accurate set of gauges. Write for Bulletin No. 260-D.

Oliver makes a complete line of the finest Saw Benches, Pattern Lathes and other woodworking machines for pattern shops. Write for complete details.

OLIVER SINCE 1890

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

Circle 755 on Inquiry Card—Page 51

VIBRATORS every size for every application

Branford alone makes the complete pneumatic vibrator line. In every size, for every application and use, there is a Branford Vibrator built to do your job better.

Rigid quality requirements . . . high grade, special steel alloys . . . immediate delivery through your own nearby distributors all make Branford your outstanding source for outstanding vibrator products.

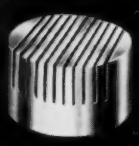
Branford makes a complete line of pneumatic vibrator accessories too. Write today for your free Branford catalog and the name of your local Branford distributor.

1915 BRANFORD VIBRATORS U. S. A.

THE BRANFORD COMPANY 130 CHESTNUT STREET — NEW HAVEN, CONNECTICUT

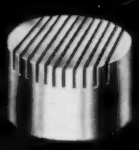
Circle 756 on Inquiry Card—Page 51

SLOTTED CORE BOX VENTS



X-TRA DEEP HEAD .156 Wide Slots .014

SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

INSERTING DRILL

- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

VENT CLEANER
- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

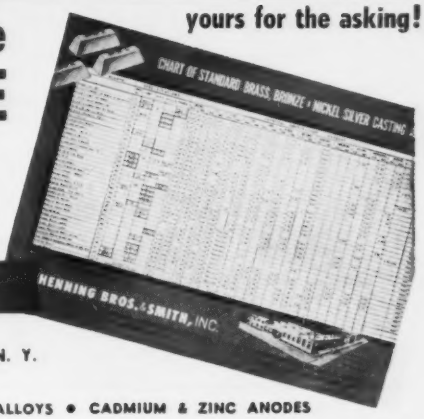
Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH

Circle 757 on Inquiry Card—Page 51

send for this valuable quick-reference 17" x 22" standard alloy wall chart FREE

yours for the asking!

This see-at-a-glance wall chart will save you hours of time in making up your specs. Chart shows all types of customer specifications: Navy, S.A.E., A.S.T.M., and Federal. It shows chemical composition, by percentages, of 37 alloys. Write today for your copy to:



HENNING BROS. & SMITH, INC.

Dependable Service Since 1922

91-125 Scott Ave. at Randolph St., Brooklyn, N. Y.
HYacinth 7-3470-1-2-3

ZINC BASE ALLOYS • BRASS, BRONZE & ALUMINUM INGOTS • LEAD & TIN BASE ALLOYS • CADMIUM & ZINC ANODES

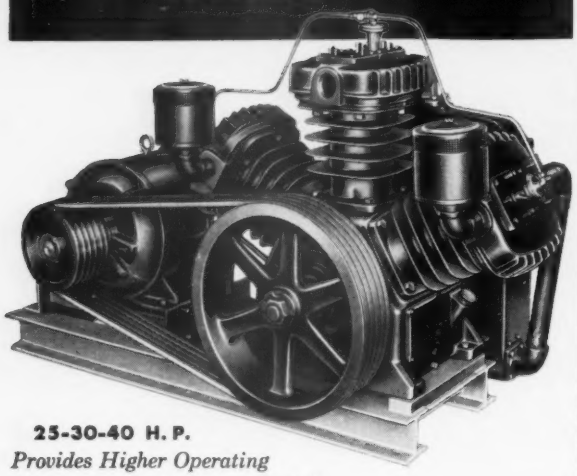
Circle 758 on Inquiry Card—Page 51

CURTIS MODEL C-100

Two-Stage, Air-Cooled Air Compressor

Delivers *MORE* Air...

PER MINUTE HORSEPOWER KILOWATT HOUR OF ELECTRICAL ENERGY CONSUMED



25-30-40 H. P.

Provides Higher Operating Efficiency Costs Less to Install

The Curtis Two-Stage Compressor assures a saving in your power costs. It's air cooled, thereby eliminating expensive water bills—quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

For complete information write for illustrated folder.

CAN COUNT ON YOU REMEMBER...

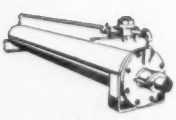
Curtis

OUR 103rd YEAR

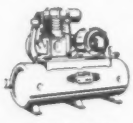
MANUFACTURING COMPANY

PNEUMATIC DIVISION

1922 Kienlen Ave. St. Louis 20, Mo.



AIR HOISTS AIR CYLINDERS

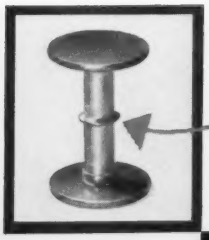


AUTOMOTIVE AIR COMPRESSORS

PACKAGED AND REMOTE AIR CONDITIONING

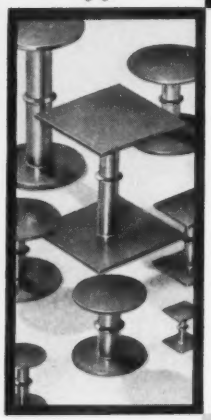
CM-21

Circle 759 on Inquiry Card—Page 51



it's the fin that stops leakage

Buffalo **LEEK-PRUF-CHAPLETS**



Castings of uniform density are assured with "Buffalo" *Leek-Pruf* Chaplets. Exclusive fin design of both Double and Single head types prevents leakage and assures positive fusion with molten metal. There is no recess in the stem to weaken the structure. Thoroughly coated to insure instant fusion. "Buffalo" Chaplets burn in more easily without chilling.

A wide variety of other types is also available to meet your specific molding needs exactly. For complete information, request Catalog No. 20.

Trial samples of any chaplets furnished without charge.

Combined

Manufactured by

SUPPLY & EQUIPMENT CO., INC.

211 CHANDLER ST., BUFFALO 7, N. Y.

Circle 760 on Inquiry Card—Page 51

CHARCOAL

HARDWOOD LUMP

also

WILLOW

ON SPECIAL ORDERS

McDONALD CHARCOAL CO.

DWIGHT BLDG. KANSAS CITY 5, MO.

One of the oldest producers in the Midwest

Circle 761 on Inquiry Card—Page 51

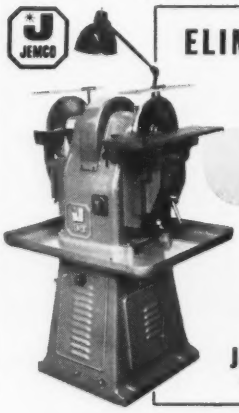
JEMCO

ELIMINATE HAND FILING

with the

JEMCO

Rotary Disc Filing Machine



Suitable for Steels
Non-Ferrous Metals
Wood and Plastics

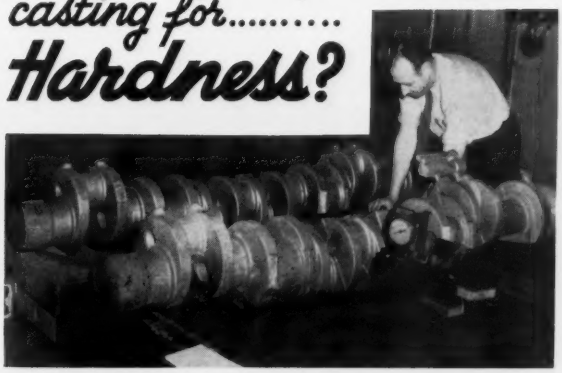
Exclusive Territories Open
Write for complete information to...

Jersey Manufacturing Company

401-F Livingston St., Elizabeth 1, N. J.

Circle 762 on Inquiry Card—Page 51

How quickly can you check this casting for..... Hardness?



Large cumbersome parts can be tested easily and accurately with a King Portable Brinell Tester. The King Portable is taken to the work, not the work to the tester. No need to cut samples for testing; no need for elaborate fixturing to hold heavy parts in a stationary testing machine. King Hardness Testers can be carried anywhere and can make tests in any position. The King Portable saves handling time; takes fast, accurate tests; and is so versatile, it soon pays for itself.

KING TESTER CORPORATION

DEPT. F 440 N. 13TH ST. PHILADELPHIA 23, PA.

Circle 763 on Inquiry Card—Page 51

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

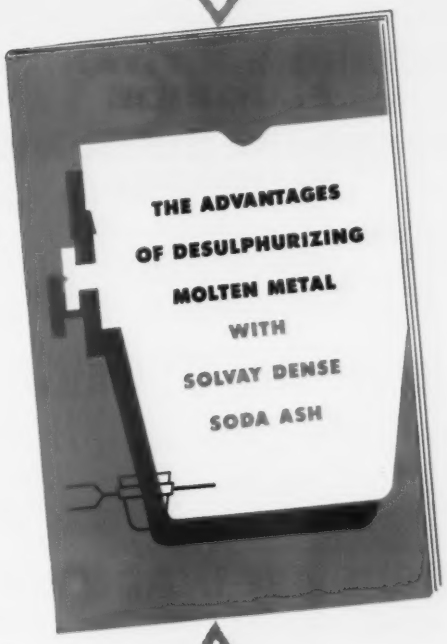
DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

Circle 764 on Inquiry Card—Page 51

Full facts on Desulphurizing at *lowest* cost!



Tells how to apply —equipment to use!

SOLVAY DENSE SODA ASH costs less . . . melts rapidly . . . disperses uniformly. Free-flowing. Requires simple equipment.

SOLVAY ®

Allied Chemical

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

Please send me without cost your booklet—"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____ AT 9

Circle 765 on Inquiry Card—Page 51

chemicals for the foundry industry

ZIRCON SAND

ZIRCON FLOUR

SILICA

POTASSIUM TITANIUM FLUORIDE

POTASSIUM ZIRCONIUM FLUORIDE

Berkshire Chemicals

INC.

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

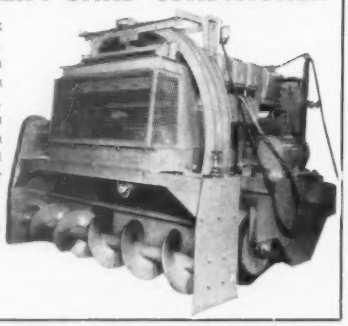
BOSTON • CHICAGO • CLEVELAND • PHILADELPHIA • SAN FRANCISCO

Circle 766 on Inquiry Card—Page 51

WORDS ARE INADEQUATE

to describe RINGLIFT SAND CONDITIONER

It must be seen at work to be fully appreciated. Picks up all sand from floor, screens it, removes tramp iron, adds moisture, mixes, tempers and puts sand back on floor in windrows. Also makes ideal facing sand. Send for names of users.



STATES ENGINEERING CORPORATION

920 W. Berry St., Fort Wayne, Ind.

Circle 767 on Inquiry Card—Page 51

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD

CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MODERNIZATION

Circle 768 on Inquiry Card—Page 51

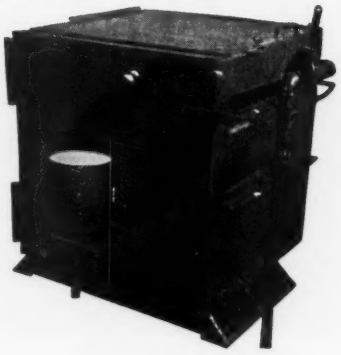
CENTRIFUGALLY CAST

AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new WATER-COOLED Model M-WC (Illustrated)



Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield at high quality, denser castings. Metal porosity eliminated.

Write for New Bulletin #257 Illustrating Model M-WC

RESEARCH FACILITIES

We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.

P. O. Box 947 Tulsa 1, Okla.

Circle 769 on Inquiry Card—Page 51

HIGH SILICA QUARTZITE PEBBLES

★ ★ ★

R. W. SIDLEY, INC.

THOMPSON, OHIO TEL. 2701

Circle 770 on Inquiry Card—Page 51

NCP makes effective PATTERN LACQUERS

1. Seals pattern to prevent moisture and water absorption.
2. Brushes easily—dries quickly.
3. Does not chip, peel, bubble, or blister, and is flexible.
4. Adds slip, promoting clean parting of pattern from sand.
5. Made in all colors.
6. Time tested material—successfully used in pattern shops all over the country for over 30 years.

The National Chemical & Plastics Co.

1424 Philpot Street Baltimore 31, Maryland

Circle 771 on Inquiry Card—Page 51

EMPIRE

"THAT GOOD"

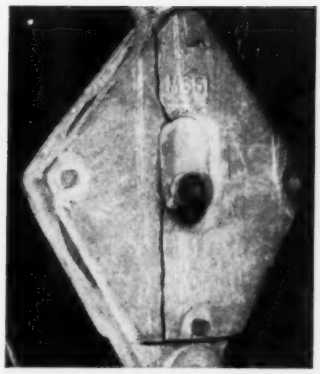
FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION

2201 First Ave., North • Birmingham 3, Ala

Phone: ALpine 1-9135

Circle 772 on Inquiry Card—Page 51



Cracked cast iron block repaired the same day ...with Ni-Rod "55"

Replacement . . . or repair? That was the dilemma facing one Ohio contractor when the 150-pound pulley block shown above cracked in the middle of a job.

Replacement was expensive and it might take days – perhaps weeks.

The contractor had heard of successful welds in cast iron with Ni-Rod* "55"* electrode and decided to go ahead with the repair.

Using Ni-Rod "55" electrode, weldors at the Alsco Welding Company in Columbus got a strong sound weld . . . had the block in operation the same day. As an extra precaution, they preheated to an estimated 250 degree. (With Ni-Rod "55" electrode this is generally unnecessary.) The weld was approximately 14 inches long, took only 1½ pounds of 5/32-inch Ni-Rod "55" electrode.

You'll like the simplicity Ni-Rod "55" electrode brings to cast iron welding. Ni-Rod "55" electrode is operable in all positions . . . gives a stable arc and metal deposition is good. Slag is easy to remove and the welds are readily machinable.

"Repair Cast Iron Parts Quickly and Easily" contains some interesting examples of welding jobs you can do with Ni-Rod "55". If you fabricate, repair or salvage cast iron parts, you might like to have a copy. If so, why not write today? *Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO **Welding Products**
Electrodes • Wires • Fluxes

Circle 773 on Inquiry Card—Page 51

CLASSIFIED ADVERTISING

Help Wanted

PLANT MANAGER

Nationally-known Pennsylvania Manufacturer has opening for a Plant Manager to assume complete charge of a large Gray Iron Foundry. Applicants must have proven ability and experience as gray iron foundrymen plus thorough knowledge and experience in supervision and direction of accounting, production control, industrial engineering and industrial relations activities. This is an opportunity for a successful and proven man to make a permanent connection with a large progressive and stable company. Salary $15,000 plus bonus. Please give complete personal data and experience in first reply. All inquiries will be held in strict confidence.

BOX 679, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY PRODUCTION SUPERINTENDENT
Precision shell molding foundry with strong engineering backing seeks first rate production man to manage and supervise foundry operations, help build production volume, cut costs. Successful production supervisory experience in nonferrous jobbing foundry and understanding of precision work required. Shell molding experience desirable. Generous salary and benefits. Ideal living and working in suburban California location. Address: Box 687, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER
Challenging position in management engineering for young foundry engineer prepared to travel. Must know gray iron foundry operations, able to make layout drawings. Industrial engineering experience desirable. Reply with photo. Box 671, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

ASSISTANT FOUNDRY SUPERINTENDENT
A medium sized company in the East, operating ferrous and nonferrous foundries, requires an assistant to the Foundry Superintendent who is approaching retirement. Experience in both type foundries is desirable, but at least five years' experience in brass pressure type casting essential. Supervisory experience also essential. Submit confidential resume covering education and experience, also salary requirement. Address: Box 700, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN
Steel casting jobbing foundry located in Western Pennsylvania producing medium and light weight castings of carbon and alloy steel. We are interested only in experienced foundryman having qualifications to take complete charge of all molding operations. Send resume of experience and salary requirements. All replies held confidential. Address: Box 692, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ASSISTANT SUPERINTENDENT
For steel foundry in the Chicago area. Must know general jobbing steel foundry problems such as heading, gating, improving quality, training and handling of men properly. Address: Box 661, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED
Mechanical Engineer—with foundry background for production supervision in HEAVY CENTRIFUGAL FOUNDRY, NONFERROUS. Address: Box 672, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKING FOREMAN
Experienced in green and dry or French sand. False core and architectural experience required. Address: P.O. Box 51, Long Island City 6, New York.

Help Wanted

WANTED
Chief Cost Accountant
for
Mechanized Gray Iron Foundry In Middle West Pouring 200 Tons per Day.
Send Personal Data Summary to:

BOX 695, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

BRASS FOUNDRY FOREMAN
Midwest location. Must be experienced in producing pressure type brass castings for the Plumbing Industry. Attractive salary if you can qualify. Address: Box 696, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

LAYOUT MAN
For metal pattern shop. Paid vacations and holidays. Steady employment. PROCESS PATTERN & ENGINEERING CO., INC., 1707 N. HARRISON ST., FORT WAYNE, INDIANA.

WANTED
Night shakeout foreman for mechanized gray iron jobbing foundry. Ounces to 12 ton capacity. Good job for right man. Address: Box 691, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CENTRIFUGAL FOREMAN
Man who can take complete charge of nonferrous centrifugal division in Milwaukee area. Preferably one with following. State age, experience and salary expected. Address: Box 690, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED
Experienced cleaning room foreman wanted for gray iron foundry making small castings. Address: Box 699, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

MECHANICAL ENGINEER

AGE 35, MARRIED. PRESENTLY IN CHARGE OF METHODS DEPARTMENT, LARGE G.I. FOUNDRY. HAD EXECUTIVE EXPERIENCE MACHINE SHOP, PLUS SALES, PRODUCTION, QUALITY CONTROL IN FOUNDRY. DESIRE POSITION WITH AGGRESSIVE FOUNDRY WHERE EFFORT AND INITIATIVE ARE DESIRED. ADDRESS: BOX 701, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumber supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 705, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGEMENT

Administrative experience in accounting, estimating, purchasing, production control. Foundry experience in all phases of gray iron and nonferrous jobbing and production castings to two tons. Accounting and technical training. Desire position with progressive foundry where challenge exists. Address: Box 703, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Thirty years' practical and technical experience, gray iron jobbing and production. Twenty years' supervision. Now employed as superintendent. Age 53. Address: Box 678, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EQUIPMENT ENGINEER

Experienced in the design of special foundry equipment and layout of electrical, pneumatic and hydraulic controls for automation. Background in industrial and consulting engineering. Age 38. Address: Box 707, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVE

College graduate with metallurgy background, calling on foundries in New York State, selling chills and chaplets, wishes to add allied line. Best references. If interested, Address: Box 708, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ASSISTANT TO PRESIDENT OR GENERAL MANAGER

Administrative and technical experiences in all phases of foundry operations. Seek position with challenge and responsibility. Address: Box 710, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKS MANAGER—SUPERINTENDENT

Capable of operating a 350 man organization, 23 years of experience in casting ferrous and nonferrous metals in sand, permanent and investment molds profitably. Address: Box 698, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHIEF INSPECTOR

Experienced in all operations of foundry and machine shop inspection. Also heavy background in customer contact and trouble shooting. Address: Box 694, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MATCHPLATE MAKER

Well versed in all the phases of pressure cast, matchplate and pattern castings field. Address: Box 683, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

With four years' production foundry experience. Considerable shell mold experience, including five types of shell machines. Address: Box 693, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 706, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Qualified in all phases of ferrous foundry operations. Address: Box 688, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited

From Employers and Qualified Applicants

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**

JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Positions Wanted

FOUNDRY EXECUTIVE

SOUND TECHNICAL AND PRACTICAL BACKGROUND IN FERROUS CASTINGS. EXCELLENT SALES AND ADVERTISING MANAGEMENT RECORD. INTERESTED ONLY IN AGGRESSIVE GROWTH COMPANY. DESIRE POSITION AS GENERAL MANAGER OR SALES MANAGER. AGE 40. EMPLOYED. ADDRESS: BOX 704, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

SUPERINTENDENT OR MANAGER

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 697, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Heavy gray iron, jobbing, molding or coremaking. Prefer Southern California or other Southern states. Over twenty years of foundry experience. Address: Box 682, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DIE CAST OR PERMANENT MOLD

Engineer and manager. Experienced sales, practical foundry work, reducing costs. Position must involve equity in business. Address: Box 685, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TOP FOUNDRYMAN

Practical experience, early forties. Now producing castings over 40,000 lbs. with CO_2. Looking for more action, excellent labor relations. Address: Box 656, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALESMAN

Experienced salesman to demonstrate and sell foundry facings and binders. Michigan Territory. Address: Box 711, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representative Available

SALES ENGINEER

Desire to represent gray iron, steel and centrifugal cast bronze foundries in Chicago area. Commission basis. Please state foundry facilities in reply. Address: Box 681, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultants

CONSULTING ENGINEER

Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold — and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, RT. #3, BOX 345, WALKERTON, INDIANA. PHONE: 712W.

SALARIED PERSONNEL

$5000-$30,000. This reliable service established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P.O. BOX 674, MANCHESTER, VERMONT.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

FOUNDERS CORRESPONDENCE SCHOOL OFFERS

A simple complete course in founding stressing the small details, practices and variables involved in the basic operations necessary to the production of quality castings. Ferrous or Nonferrous. Address: Box 702, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED TO BUY

No. 2½F or 3F Simpson Mix Muller with all controls. Address: Box 689, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale Or Lease

FOR SALE—LEASE—OR JOINT VENTURE

Gray iron foundry, located in southern Missouri close to St. Louis and Kansas City markets. 12,000 sq. ft. plus storage facilities. Address: Box 674, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE OR LEASE

Going nonferrous foundry, fully equipped, 3 oil furnaces, good brick building. Highly industrialized area Northeastern Illinois. Owner retiring. Address: Box 709, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE OR LEASE

Brass, Bronze and Aluminum Foundry. Established 45 years. Metropolitan area. Address: P.O. Box 51, Long Island City 6, New York.

Foundry Wanted

PERMANENT MOLD OR DIE CAST

Want substantial equity in small, promising foundry in exchange for cash or services. Well experienced in all phases. Address: Box 684, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

For Sale

For Sale

SACRIFICE SALE

STEEL CASTING PLANT EQUIPMENT

Located at former American Steel Foundry Plant
East St. Louis, Illinois

85—Standard gauge Charging Cars—Standard small couplers
6—25-ton Bottom Pour Ladles
2—Shockless Jolt Strip Molding Machines—16" Cyl. 10,000 # cap.
23—Sand Boxes
3—Sand Bins—125 ton, 150 ton, 200 ton
1—Table Type House Blast
1—5 Car Continuous Annealer
4—Single Car Type Heat Treating Furnaces
1—Steam Hammer, 8" x 20"
12—DC Electric Bridge Cranes—5 ton to 35 ton
Air Hoists—Jib Cranes
Steel Shelving—Steel Lockers

Other Equipment—Write for List—Prints Available

Also Modern 17 Acre Plant—A-1 Condition—228,000 sq. ft. 1 Story—Production Space—Offices—Store Rooms—Cafeteria Machine Shops—Full trackage, Etc.

Located in a Surplus Labor Area.

HYMAN-MICHAELS COMPANY
2039 E. BROADWAY E. ST. LOUIS, ILL. 'Phone: BRIDGE 1-6300

FOR SALE

Wheelabrator Shot Peening Cabinets (will clean steel plates)	
Osborn 275	$225.00
Tabor, 10" Molding Machine	90.00
Tabor Jolt Pin Stripper	350.00
American Dustube #65 KD, 4500-5700 CFM with motor and blower	1000.00
Gehnrich & Gehnrich Preheating Oven, 600° F. complete with controls	650.00
Burring Booth, magnesium, Newcomb Detroit	500.00
Uniwash Dust Collector, 5600 CFM	450.00
Ruemelin Cabinet, 5' x 3' with dust collector, motor and blower	500.00
Pangborn 4' x 30" sand blasting cabinet with dust collector, blower and motor.	400.00
American Rotoclone, sludge type, 2500 CFM complete with 5 HP motor, blower and controls	425.00

M. ELSTEIN
426 GRAND ST.
JERSEY CITY 2, N. J.

FOR SALE

5—Simpson #0 Mullers—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer. Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
2—Schneible Type HC Multi-Wash Dust Collectors, 5270 cfm (never used).
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models: 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U.S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

WANTED FOR CASH

Turn your surplus new motor inventory into quick cash! Sell your surplus new motors to Ajax Electric Motor Corp.

MOTORS AVAILABLE — NEVER USED

Shipped from stock of over 5,000. ¼ to 200 HP—Special Low Prices.

WRITE, WIRE OR PHONE COLLECT:
AJAX ELECTRIC MOTOR CORP.
P.O. BOX 262, ROCHESTER, N.Y.
LONG DISTANCE PHONE LD. 132

SAND BLAST EQUIPMENT
SELL—BUY—TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

9' LG-14 Pangborn Table	$4500.00
6' LE Pangborn Air Table	800.00
Pangborn 53 EN2 Hand Cabinet	325.00
Pangborn Auto Feening Cabinet	1100.00
48 x 48 Wheelabrator Tumblast	5000.00
42 x 48 Wheelabrator Tumblast	1500.00
36 x 42 Wheelabrator Tumblast	2000.00
27 x 36 Wheelabrator Tumblast	2750.00
15" Continuous Wheelabrator Tumblast	2000.00
8' Wheelabrator Table Blast	2000.00
6' Wheelabrator Table Blast	3000.00
4' Wheelabrator Table Blast	2500.00
Vapor Blast Cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
VI-30750

We Will Buy one piece or your entire plant.

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

MOLDING MACHINE

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston)

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

One American Sand Cutter Model M, size 89/70 in excellent condition. Price $700.00. Address: T. W. KELLER, INC., 806 W. FIFTH ST., LANSDALE, PENNSYLVANIA.

FOR SALE

#2 SIMPSON MIXER—LOADER, USED ONLY TWO YEARS, NEW GUARANTEE, LESS THAN HALF COST.

Carl Mayer Core Oven—48" wide, 32" deep; 51" high	$250.00
Aluminum Melting Furnaces Hand Tilting; 400# cap.	ea. 250.00
500# Aluminum Holding Furnaces	ea. 250.00
Model SB-11 International Core Blower	350.00
Model AA American Sandcutter 60" New Blade	250.00

MOLDING MACHINES

213 SPO; 4½" jolt; 13" squeeze
2114 SPO—11" sq.
2136 SPO—13" sq.
720 U Osborn—11" sq.
Tabor—30" x 40"; 12" draw; shockless—1000#
2047 Osborn—18" x 24"; stationary
601—6.2—605 Osborns
275J Osborn Squeezers

CORE BLOWERS

Bedford—Bench Type
#193 and #94 Osborn

FURNACES

2000 lb. Stroman—Tilting Hydraulic Aluminum Melting
2000 lb. Fisher—Aluminum
350 lb. Detro't Rocker Barrel
Stroman Reverberating—300# Aluminum; 900# Brass cap.

CORE OVENS

Dielectric—Model 900A and 1800A

MISCELLANEOUS

Jib Cranes—2 ton cap.
U. S. 7½ HP 3 speed grinders; 28" wheel
Model S Screenerators—B & P
#42 Osborn Hand Rollovers

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152nd STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE

1—Coleman, external recirculating mold or core drying batch oven. Outside dimensions: 16'4" wide x 20'8" long x 10'6" high, exclusive of recirculation furnace.

Door opening one end, 14'0" wide x 9'6" high. Rockwool insulation in walls, roof and door complete with:

1—motor driven car, 12'0" wide x 18'0" long. External recirculation system located on top of oven.
1—Clarage recirculating fan.
1—Clarage exhaust fan.

Gas fired with automatic temperature controls with safety equipment. Price $4800.00 f.o.b. Milwaukee, Wisconsin.

CRUCIBLE STEEL CASTING COMPANY
2859 SOUTH 20TH STREET
MILWAUKEE 15, WISCONSIN

BLOWERS FOR SALE

Spencer—No. Amer.—Stroman

Capacities from 60 to 4500 CFM at 2, 12, 16 and 24 ounces.
Motors for 110/60, 220/440/3/25 and 60 cycle and 230 volt DC.

Let us quote on your requirements!

R. C. CHELIUS
31 PALMER AVE.
KENMORE, BUFFALO 17, N. Y.

FOR SALE

1—American #3 Tablast, 4-48" tables, excellent condition. Address inquiries to: Box 686, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Motive Sandslinger in "like new" condition. Price right. For details, Address: Box 680, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Wheelabrator Tumblast, 42 x 48 in good condition. Can be seen in operation. $3450.00. Address: CHAPIN CYLINDER HEAD CO., CHAPIN, ILL., PHONE #3.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

3—SPO #113 J Molding Machines—18½" x 26" table

1—B & P Speed Draw—7500# capacity—table up to 60 x 60 flask. New 1955—Hardly used

1—B & P Speedmullor New 1948—air cooled—Cutler-Hammer compensator. A-1 Condition

1—B & P Stationary Slinger installation, 19" head, 210 cu. ft. National Rotary plate feeder, 4' x 10'—Simplicity shaker screen, flat belt conveyor with magnetic separator—Condition excellent

4—Super Handy Sandy units—Model SHS-7-G—Capacity 35 TPH—New 1956. Used 3 Months

1—Syntron F45 Vibra Flow feeder—100 TPH

1—National troughing belt conveyor—36" wide x 43'-7" with 24" belt

1—Standard Electrical Tool #33VL variable speed snagging grinder for 30 x 3 x 12 wheel—New 1957

1—Foxboro airweight control—Model 10

1—48" Cutler-Hammer magnet—Not used since being re-wound

1—55" Cutler-Hammer magnet

1—Redford #4 core blower with side clamps, New 1954.

1—Rebuilt Clark Electric carloader—6000# with charger

1—18" Whitcomb lathe with Lima drive

93—Stock size hardwood patterns—will make rounds and squares up to 8" x 10" x 48" and 12½" dia. x 9" lg.

1—P & H 5-Ton two motor overhead traveling crane trolley—with new spare motors 20 HP & 3 HP together with cab and control panel—All new 1955

1-Lot Squeezer flasks & jackets up to 18" x 18" also side & center floor steel and cast flasks

MARION MACHINE FOUNDRY, INC.
P.O. BOX 989
MARION, IND.
PHONE 412

For Sale

POWER EQUIPMENT CO.
OFFERS
BARGAIN PRICES
ON GUARANTEED
NEVER USED AND REBUILT
MOTORS!

SEPTEMBER SPECIALS
NEVER USED MOTORS

HP	Make	Type	Speed
50	Wagner-TEFCBB	CP-504	900
40	Wagner-TEFCBB	CP-405	1800
30	Wagner-TEFCBB	CP-444	900

Send for our FREE Catalog

Cash for your surplus new & used electric equipment.
Send your list today.

Large line of motors, control equipment, AC & DC Generators, MG sets and transformers.

Phone GEnesee 8-5629
POWER EQUIPMENT CO.
8 Cairn St., Rochester 2, N. Y.
Phone GEnesee 8-5629

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

For Sale

FOR SALE

TABOR, jar rollover, power draw, table 22x42, 600 lb. cap.
OSBORN, jolt rollover, table 30x40
J&J, #918, rollover, with rollout table
INT., rollover, 30x8, portable
INT., rollover, 24x10, portable
INT., rollover, 30x8, portable, no jolt
DAVENPORT, #28SA, jolt rollover
J & J, rollover 24x30
10—OSBORN 275J, Squeezers, portable
2—OSBORN 275J, Squeezers, Stationary
2—CHAMPION Model JS-10S Jolt Squeezers
2—MILWAUKEE Squeezers, Stationary
2—INTERNATIONAL Squeezers, Portable
6—ARCADE Model 100S Jolt Squeezers, Stat.
HERMAN Jolt Stripper, 48x54
INTERNATIONAL Plain Jolt, 36x48 Table
NICHOLS Plain Molding Machine, High Speed
OSBORN #7012, Portable Jolt Squeezer, pin lift, 20x22
SPO Model 506 SP-2, Jolt rollover, Pattern Draw, Pin Lift, 22x26 table
3—INT. TYPE R, Core Maker Rollovers, Hand
INTERNATIONAL Core Blower SB 13
INTERNATIONAL Core Blower SB 11
CHAMPION Core Blower CB 18
DEMMLER Core Blower Style 1
DEMMLER Core Blower Style 2
PORBECK Core Oven Drawer Type
3—COLEMAN Core Ovens Drawer Type
CLIMAX Wire Straightener No. 2
ROYER Screenarators
SIMPLICITY Screenarators
SAND MIXERS, paddle type
GRINDERS 1 hp. to 25 hp.
DISC GRINDERS
POURING DEVICES & DISTRIBUTORS
LADLES ALL TYPES 50 lb. to 5000 lb.
GYRATORY RIDDLES, 20" to 24"
MONORAIL & BRIDGES
AIR HOISTS, 500 lb. to 4000 lb.
OVERHEAD CHAIN CONVEYOR, #458 and DRIVES
BLOWERS, ALL SIZES, CENTRIFUGAL & POSITIVE
DUST COLLECTORS, ALL SIZES
TRANSITE CORE PLATES, ALL SIZES
FLASKS—THOUSANDS IN STOCK—ALL SIZES STEEL—ALUMINUM—JACKETS

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE

HOMAN MACHINERY COMPANY
710 E. FRONT ST.
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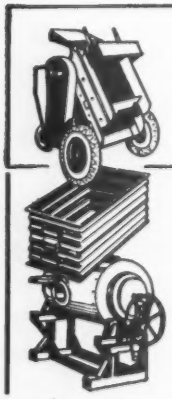
MAin 1-0339



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO

OSBORN ROLLOVERS:

5—405, 18" to 26" draw, air clamps, 3500# capacity

TUMBLING MILLS:

1—60" x 72" Ransohoff wet type 220/440/3/60
1—36" x 54" Royersford, belt driven
2—32" x 68" & 50" x 80" Sly

WHEELABRATORS

1—20" x 27" 2 cu. ft.
1—48" x 42" 17½ cu ft. with loader

MULLERS

2—610 Clearfield 14 cu ft. capacity
1—3 Simpson 30 cu ft. capacity

SWING GRINDERS

10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:

1—250 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

SULLIVAN angle compound, 600 CFM.
3—INGERSOLL RAND, Model ES-1. Size 9 x 9, 225 CFM, 40 HP motor.

AIR & ELECTRIC HOISTS

85—INGERSOLL RAND Air Hoists, Sizes RC-5, A, B, C, ¼, ½, 1 ton.
15—DETROIT Air Hoists, 1 & 1½ ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.

BUCKET ELEVATORS

12—LINK BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 buckets.

CUT-OFF MACHINES

1—AMERICAN D Rod Straightener and Shear.
1—DeWALT ME2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13. SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—REDFORD & MILWAUKEE Bench.
1—SPO Model SC-10-DM Shell Core Blower
1—SAN-BLO, Model CB-40-B, 40# cores.

CORE OVENS

4—CARL MAYER 2-Compartment, gas fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates & controllers.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.
1—MODERN No. 3½ Cupola
1—CUPOLA Bondactor, style 1250-L.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.
1—BOOTH one ton, direct arc, side charge with 1500 KVA Transformer with gear and all controls.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type
1—SURFACE COMBUSTION, 54" x 96", box-type, gas fired, 1850° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary. 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.

Plain Jolt

1—HERMAN 40" x 70" table, 6000# cap.
1—HERMAN 40" x 58" table, 6000# cap.
1—DAVENPORT 24AJ, 24" x 30" table.
1—HERMAN 8' x 12' table, 32,000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
3—TABOR 30" x 40" Table. 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" table.
2—OSBORN #559, 25" x 30" Table.
1—OSBORN #563, 55" x 63" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26".
1—SPO 2160-R-4, Table 25 x 34, with Automatic Controls.
2—SPO #2134, 19" x 27" Table.

MUST BE SOLD!
BRIDGE CRANES

P&H 20 ton Overhead Bridge Crane, span 40'—Cab Operated w/20 ton main hook and 5 ton auxiliary hook. Max. lift 25'. 230 volt DC.
WHITING 5 ton Overhead Bridge Crane. Span 50'—Cab Operated. W/160' runway and "A" frame. 220/440 volt AC.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors.

Oscillating

1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80'
1—ROBINS Vibra-Veyor 24" W x 100' long x 8" deep pan, New 1953, like new.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7' long, total unit 24" W x 49' long, w/MG set. New 1949.

Roller

2500' MATHEWS 6" & 20" wide, 2⅞" dia. roller, 11" hex shaft centers, 4" channel.
500—MATHEWS 12" x 36" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins. 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P #50, Speed Muller, 9 cu. ft.
1—B & P #60, Speed Muller, 12 cu. ft.
2—B & P #70, Speed Mullers, 18 cu. ft.
1—B & P #7, Mulbaro, 700# cap.
1—BAKER PERKINS #16½, 30 HP.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
2—CLEARFIELD #920, 25-30 cu. ft.
1—DRAVO-DOYLE 6 cu. ft cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
1—SIMPSON #0, Style B, 175 lb.
2—SIMPSON #1, Style B, 400 lb.
1—SIMPSON #1, Style UD, 500 lb.
1—SIMPSON #1½, Style UD w/loader.
1—SIMPSON #2, Style C, 1500 lb.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu. ft. paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—ROYER S-522-9 Scrap Control 60 ton per hour capacity.
1—AMERICAN "Sand Master," 102"/70" cutting blade—1952.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—ROBBINS 8' x 10' Model JF-11 Dual.
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B. single deck sifter screen, 10 HP motors.
1—HEWITT - ROBINS Vibra - Feeder 30" wide x 60" long.
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN 27" x 36" with skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
1—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53, type EN-2 blast cabinet with dust collector
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD—CLEVELAND 10, OHIO—CALL LI. 1-6545

AUCTION SALE

ELECTRIC FURNACE COMPANY

Machine Shop and Centerless Grinding Shop

on the Premises of

CLOVER FOUNDRY

11th & Western Avenue • Muskegon, Michigan

Tuesday, SEPTEMBER 17, 1957 at 10 A.M. EST

2—Moore Lectromelt Size Q Direct Arc Electric Melting Furnaces, 4000# per hour capacity, 1500 KVA transformers, 13,200 volt primary.

1—Moore Lectromelt—Size S Direct Arc Electric Melting Furnace, 1000# per hour capacity, 500 KVA transformer, 7200 volt primary.

2—Detroit Electric, Single Phase Electric Melting Furnaces, Size LFC, 350# capacity, 3" electrodes complete with 7200 volt primary transformers.

1—Detroit Electric, Single Phase Electric Melting Furnace, Size LFY, 750# cold charge capacity, 7200 volt transformer and equipment.

3—1250 KVA Stepdown Transformers, 22,000 V primary to 13,800 V secondary.

AIR COMPRESSOR

Ingersol Rand XRE, Imperial 75 HP 440V Synchronous motor.

DUST COLLECTORS

40,000 cfm Parsons, 4 section.

12,960 cfm Parsons.

FLASKS

2500 Stacking Flasks 12" x 18" x 3"—¾" pins and bushings, Style LD Sterling.

GRINDERS

2—Cincinnati #3 Centerless Filmatic Grinders.

1—Cincinnati #2 Centerless Filmatic Grinder.

6—Cincinnati #2 Centerless Grinders.

2—Model 2000 Feedall Units.

1—Gardner #122 Single End, Rotary Feed Wheel Tap Fixture.

1—Besley #8 20" x 2" x 9" Single End Disc Grinder.

1—Cincinnati D.E. Snag Grinder, 16" x 2" wheels.

1—Van Dorn—Black & Decker Double End Grinder, 20" x 2" wheels.

1—Thor "6" Bench Grinder.

HEAT TREATING

L. & N. Vapo-Carb Heat Treat Furnace, 8" x 14" pot 1600° and 12" x 16" pot 1850° with Micromax Controls.

HOISTS

2—Yale 4000# Motoveyors, metal pouring, 17' lift, 30 FPM speed of lift, pendant controls.

2—Yale 10,000# Electric Monorail Hoists, power hoist and travel, 25' lift, 15 FPM.

2—Yale 6000# Electric Monorail Hoists, power hoist and travel, 25' lift, 30 FPM speed of lift.

10—Yale and Budgit Hoists, 500# to 2000#.

INSPECTION EQUIPMENT

Arlin Automatic Rockwell Inspection Unit for production Rockwell inspection of small parts.

4—Wilson Setomatic Testers 3YR.

1—Wilson Setomatic Tester 4YR.

1—Wilson Setomatic Tester 2½HM.

1—Steel City Brinnel Tester Model UK-300M w/foot switch.

LABORATORY EQUIPMENT

Christian Becker Chain O Matic Balance.

4—Leeds and Northrup Optical Pyrometers.

2—Pyro Optical Pyrometers.

1—Coleman PH Jr. Spectophotometer.

1—Dietert Automatic Clock Permeability Meter.

1—Dietert Sand Strength Machine.

3—Speedy Moisture Tellers.

LADLES

8—Industrial 2125# 27" x 27" Geared Covered Ladles.

1—Industrial 6000# 44" x 44" Geared Covered Crane Ladle.

MACHINE SHOP

Milwaukee #2H Plain Mill.

Cincinnati 24" Back Geared Shaper.

Arter 8" Rotary Grinder, magnetic chuck.

U. S. Hand Mill, 6" x 27" table.

2—South Bend 14" x 16" Lathes, Q.C., 30" between centers, threading attachment, taper attachment, chucks, steady rests.

2—Wells Band Saws.

Sundstrand 6" x 24" Lathe, pan bed.

LeBlonde Rapid Production Lathe.

Hobart 200 Amp Welder.

Lincoln 300 Amp Welder.

Delta Toolmakers Grinder.

Delta 6" B.B. Carbide Tool Grinder.

Layout Plates.

MISCELLANEOUS

Parts bins, shop desks and furniture, stock shelves, spare parts for electric furnaces and machines listed above.

MOBILE EQUIPMENT

G. M. C. 3½ Ton Dump Truck, 1955.

G. M. C. ¾ Ton Pickup Truck, 1955.

2—Clark 4000# Lift Trucks.

1000 Lift Truck Stacking Parts Bins, 24" x 26" x 22" high.

MOLDING MACHINES

1—Milwaukee 103 Jolt Squeezer.

1—Tabor Portable Jolt Squeezer Pin Lift.

SAND HANDLING EQUIPMENT

Wonder Paddle Type Mixer, 20" x 30" barrel.

16" x 169' C—Flat Overhead Sand Belt.

20" x 8'—Flat Belt Conveyor.

32' 9" C. To C. Bucket Elevator, 7" x 14" buckets, 18" centers.

25' 9" Bucket Elevator, 7" x 14" buckets, 18" centers.

SCALES

2—Fairbanks 6250# Printomatic, dial type, 5000# x 5# on dial, 4' x 6' platform, pitless.

1—Fairbanks 3200# Weigh Count Scale, dial type, 2000# on dial x 2# graduations, 4' x 6' platform, pitless.

2—Fairbanks 500# Weigh Count, 22" x 29" platform, pit type, ½# graduations.

SHAKEOUTS

2—Simplicity 3 x 5 Shakeouts, Model 35-SOS.

SPRUE CUTTER

Milwaukee 85 Sprue Cutter, 16" x 30" adjustable table.

TOTE BINS

1000—Lift Truck Stock Bins, 24" x 36" x 22" high.

TUMBLING MILLS

3—36" x 72" Whiting Tumbling Barrels.

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1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
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1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 42"
1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
10—WHITING 36" x 36" x 72" w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round

CONVEYORS

1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
1—JEFFERY, 3 compartment, ingot mold
4—SAND ELEVATORS. Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS

1—CHAMPION CB-12
3—INTERNATIONAL SB-13
12—DEMMLER #1, #2, #2A, #2K, #3K, #4E
4—OSBORN, #91, #92, #192, #91-10
1—TACCONE #4D, 10" Draw Stroke Cyl.
1—RANDALL, Model "A", Bench Type

CUPOLAS

1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
1—TABOR Cupolette, 48" dia, 9" cap.
1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control
1—WHITING #7 w/Skip Charger, Blower, and Foxboro Control

DUST COLLECTORS

9—ROTOCLONE #12 Type N, #14D, #16W, #20D, Type W 30"
1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H

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9' SWINDELL Top Charge, Very Late

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1—3 KW, AJAX, Lab type
1—20 KW, AJAX SPARK GAP, High Frequency
1—20 KW AJAX, 50 # capacity
1—40 KW AJAX Spark Gap
1—60 KW, 3000 Cycle
1—200 KW AJAX
1—333 KW AJAX 1000 #

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Motive Speedslinger

- Hydraulically Controlled
- 22" Head 5" Tip
- 2,000 lb. Capacity

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2—FISHER, Gas, Stationary, 4 Burner, 500 # cap.
1—HAUSFELD, Tilting, 1200 # capacity
1—STROMAN, Gas, Tilting, 1000 # cap. Alum., auto control hyd. lift
1—REDA 550 #. Never Used

GRINDERS

1—GARDNER 12" x 2½" wheels, 5 HP
1—HISEY WOLF, Model 4, 16" x 2" wheels, 7½ HP
3—U.S. Model 64, 14" x 2" wheels, 5 HP
1—U.S. Model 66, 14" x 3" wheels, 7½ HP
1—U.S. Model 65, 20" x 3" wheels, 10 HP Swing Frame
1—MUMMERT DIXON, 16" x 2" wheels, 7½ HP
4—22" wheels, 10 or 15 HP
1—CINCINNATI, 5 HP, 2/60/110

MOLDING MACHINES

Jolt Rollover Pattern Draw

2—J & J #918, 44 x 54 Table, 20" draw
2—J & J #815, 30" x 40", 15" draw, 1200 # jolt
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—HERMAN 10,000 #, 48" x 109" table
1—HERMAN 6000 #, 50" x 72"
1—HERMAN 3000 #, 30" x 66" Table
2—HERMAN 1500 #
1—HERMAN 750 #, 30" x 36"
2—OSBORN #602, 36" x 26", 900 #
1—OSBORN #405, 3000 #, flask size 64" x 50", 18" draw
3—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000 # capacity
1—TABOR, 30" x 40" w/air clamps, 1000 #
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000 #
1—TABOR, 14" x 16" Rockover
1—J & J #610 RP, 24" x 30" Table, 600 #
1—J & J #1020, 50" x 60" Table, 3,000 #

Bumpers

1—OSBORN #102
2—DAVENPORT, Table sizes 24" x 27", 30" x 30"
1—SPO #58P, 18" x 28" table, 800 #

Jolt Pin Lift

1—J & J #681-C, 30" x 25" table, 600 #
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" table, 600 #
1—MILWAUKEE #1536, 32" x 38", 1500 #
1—OSBORN #559, 25" x 30" table, 6" draw, 1200 #

Jolt Squeeze Pin Lift

1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200 #
2—MILWAUKEE #163 15" x 24" table, 11" sq.
2—OSBORN #712, 18" x 28" table, 12" sq.
4—SPO #2114P, 21" x 27" table
1—SPO #2136G, 21" x 30" table

Jolt Squeezers

2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL, #12 LJS, 17" x 20" table, stationary and portable
6—TABOR, 3" Jolt, 17 x 20"
1—NICHOLS #12 F-P, portable, 600 #
12—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400 #
2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq.
2—OSBORN #275-J, Port., 17" x 26" Tables, 500 #

MATERIAL HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—Electric Magnet, 47" x 47", 20" deep
1—CLARK, Fork Lift, Gas, 3000 lb. capacity, Solid Tire

MULLERS AND MIXERS

1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch
1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.
2—SIMPSON #1, 4 cu. ft. batch, 2 wheels, Open Gear
1—SIMPSON #2, Open Gear w/loader
1—SIMPSON #0, 3' Diameter, 175 lbs.

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36" x 66" WHITING Ladle, Tilting Type, Complete w/gas preheating unit, Portable Type

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1—COLEMAN, OIL, one compartment, recirc., 60" W x 50" H x 14' 6" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, OD. 22' x 12' x 10'
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L

SAND CONDITIONING

1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
1—ROYER, NB-2, Portable, 7-10 tons/hr.
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
1—B & P Screenerator, Model "M"
1—SIMPLICITY Shakeout, 4' x 10' Screen

SAND CUTTERS

1—AMERICAN, 15 HP, 96/97 Reel

MISCELLANEOUS

1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
1—PATTERSON-KELLEY Twin Shell Dry Blender, 3 cu. ft. capacity

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Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
1—Whiting-Allis Chalmers Turbo, 5750 CFM 28 oz. 60 HP 440V air pressure Controls.
Whiting Spencer 5600 cfm, 75 HP 220/440, Late.

BUCKET ELEVATORS
16" Belt—32' Centers.
16" Belt—25' Centers.

CONVEYORS, BELTS
24" x 60' Trough.
18" x 126' Flat Belt.

CONVEYORS, VIBRATING
36" x 162' Oscillating Pan Link Belt.
30" x 53' Oscillating Pan Link Belt.

CORE BLOWERS
3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
1—Champion CB 15.
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
2—Redford Bench Type.

CORE GRINDERS
5—Milwaukee 70-9.
1—Owasso #DE-1.

CORE OVENS
Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.
1—Thermonic 1800A.

CORE OVEN VERTICAL HORIZONTAL
1—Coleman, combination oil or gas fired 43 carriers 24" x 90" —1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman combination oil or gas fired 43—2 shelf carriers 30" x 144" long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS
Coleman Gas Fired 28'-25" x 42" opening.

NORMALIZING OVEN
Despatch DT 36 Electric—Pit type, 42" x 40" baskets, 220V.

DUST COLLECTORS
Parsons 45,000 cfm.
2—Rotoclone Size 8, Dry Type.

ELECTRIC CRANE & RUNWAY
270' x 50' Crane Runway with A Frame supports and 2 cranes.
1—P & H 5 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.
1—P & H 3 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.

ELECTRIC MELTING FURNACES
Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.
Detroit 350#-750# shells 2300V Primary, Complete with controls.

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Stroman 1000# hydraulic Tilt-oil.
Stroman 300-400# hand tilt oil-gas.
Eclipse 100# RB stationary gas.
Stroman 350#.
Lindberg 500# ASM 600.

GRINDERS, SNAGGING
2—Hammond 10 WRI D. E. Snag. 20" dia. wheels, 10 HP 220/440 v motors, variable speed drives.
1—3" x 24" U.S. #65, 20 HP 220/440V.
1—7½ HP Hammond D. E. Snag Grinder.

GRINDERS, SWING FRAME
1—3" x 24" x 12" Marschke, 20 HP.
1—3" x 24" x 12" U.S. 15 HP.
1—2½" x 20" x 6" U.S., 10 HP.

HOT METAL CARRIERS
3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

LADLES
2000# Whiting Jr. & Car.
5000# Modern Geared.
8—2125# Industrial Covered Crane.

MOLDING MACHINES
Jolt Squeezers:
1—Milwaukee 103-11 Staty. Jolt Squeezer, 13½" x 20" table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18" x 21" table.
1—Osborn 275J.
1—Taccone Model TD4, high production diaphragm molding machine.
2—Milwaukee 104-5 Staty. Jolt Squeezers.
Jolt Squeeze Pin Lifts:
6—712 PJ Osborn, 18" x 28" table.

ROLLOVERS
1—Herman 4000# Series 30" x 60" table.
1—Herman 3000# Series 40" x 84" table, special slotted table.
1—Herman 1500# Series 20" x 36" table.
2—Herman 750# Series 20" x 30" table.
2—Herman 750# Series 20" x 24" table.
3—SPO Model 9032.
2—International Type G, Portable, 20" x 8" draw.
3—Tabor Portable Rollover 30".
Johnston & Jennings 1020-44 x 44 max. Flask Size.
Osborn #405 20" x 60" table.

PIN LIFT PUSHOFFS
1—Champion Pin Pushoff 28" x 42" table 10" draw.
2—Milwaukee 620 ND-20" x 24" table.

MULLERS
Simpson #2 Unit drive with skip hoist.
Simpson #2 Unit drive.
Simpson #3, Unit Drive.

OVERHEAD TROLLEY CONVEYORS
2000' Jervis B. Webb & Link Belt 678 chain, 2 D.C. motor drives and MG set.

POURING DEVICES
3—Pouring devices, Whiting 500#.

SHAKEOUTS
Link Belt 5' x 10'—7½ HP motor.
2—Simplicity 3 x 5.
1—Simplicity 4 x 6.

SPRUE CUTTERS
2—Perkins #53.
Milwaukee #85.

STRAIGTHENING PRESS
150 Ton Dual Ram Dennison C Frame Hydraulic, 30" x 108" table.
50 Ton Oil Gear C Frame Hydraulic, 30" x 40" table.
Hannifin S-200, 20 ton.

TESTING EQUIPMENT
Arlin Automatic Rockwell Tester, Model 823.
5—Wilson Set-O-Matic Rockwell Testers.
Steel City Brinell Tester.
Tinius Olsen Brinell Tester.

TUMBLING BARRELS
3—Royersford 42' x 72' Roller Bearing, Chain Drive
1—Sly Square 42 x 42 x 64.
1—Sly 42" Dia. x 56".

WIRE STRAIGHTENERS
Climax 2A.

WHEELABRATORS
48" x 42" American, bucket loader.
42" x 48" American w/bucket loader and dust collector.
27" x 36" American w/bucket loader.
20" x 27" American Rubber Belt.

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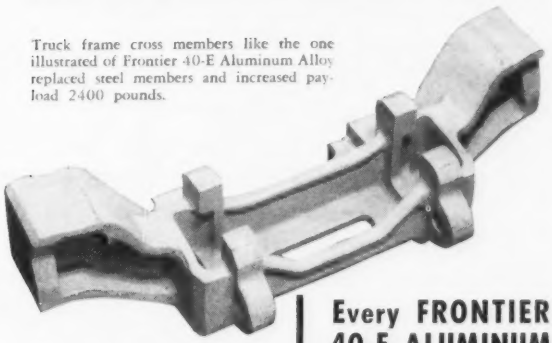

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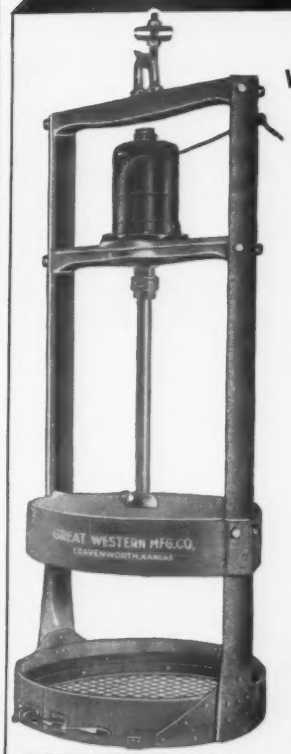

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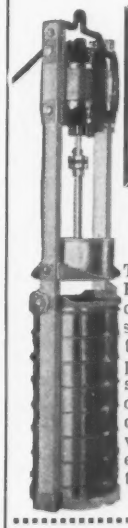

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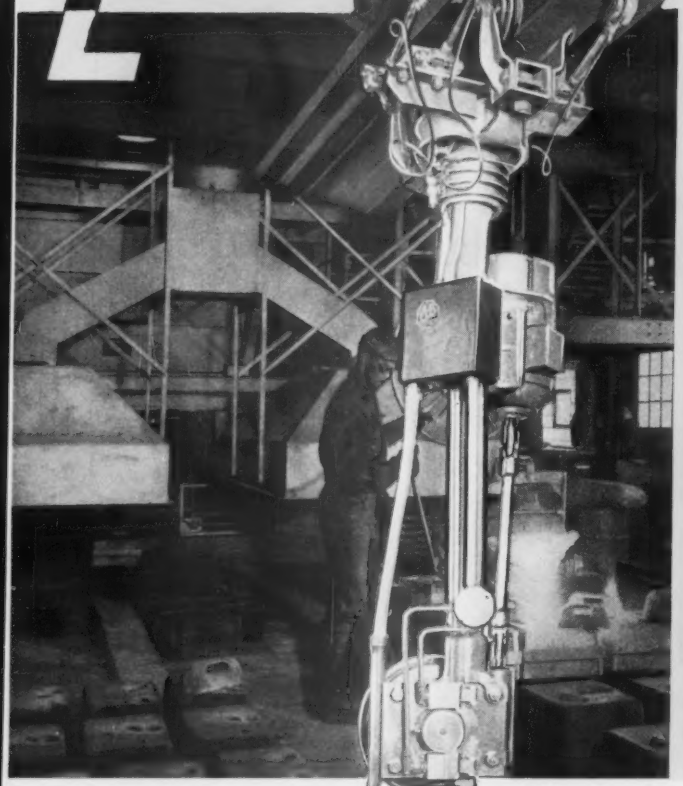

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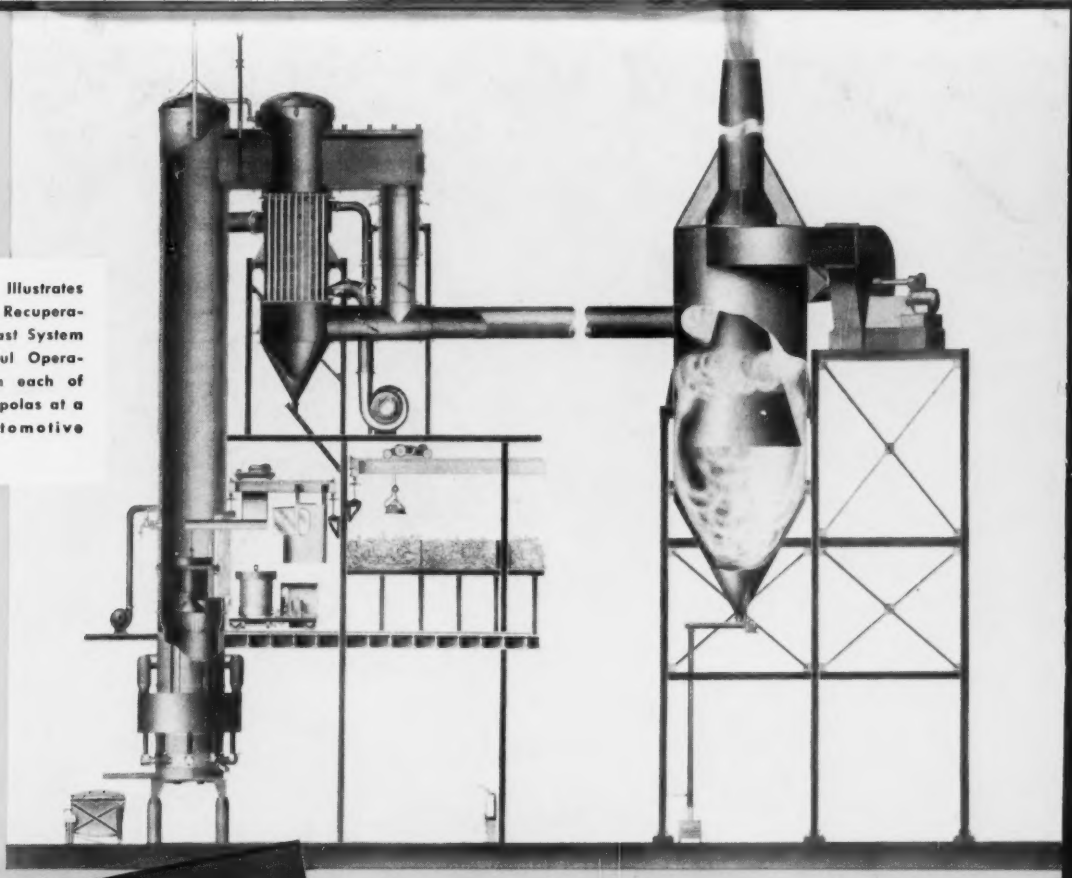

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Grindle DIVISION

Recuperative HOT BLAST SYSTEM

Saves $38,000 per year —on coke alone

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2) Increased Melting Capacity. With Grindle Recuperative Hot Blast Systems the charging cycle and melting time is shortened, thus increasing the melting output up to 22%.

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